Practitioner's Docket No. 6277

CHAPTER II 09/857937

Preliminary Classification:

Proposed Class:

Subclass:

NOTE: "All applicants are requested to include a preliminary classification on newly filed patent applications. The preliminary classification, preferably class and subclass designations, should be identified in the upper right-hand corner of the letter of transmittal accompanying the application papers, for example 'Proposed Class 2, subclass 129.'" M.P.E.P., § 601, 7th ed.

TRANSMITTAL LETTER TO THE UNITED STATES ELECTED OFFICE (EO/US)

(ENTRY INTO U.S. NATIONAL PHASE UNDER CHAPTER II)

PCT/GB99/04213	13 December 1999	11 December 1998
INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED

WEBBING TIE DOWN ASSEMBLY

TITLE OF INVENTION

DENNIS, Stefan P., TEMPLETON, John D.

APPLICANT(S)

Box PCT
Assistant Commissioner for Patents
Washington D.C. 20231

ATTENTION: EO/US

CERTIFICATION UNDER 37 C.F.R. § 1.10*

*(Express Mail label number is **mandatory**.)*
(Express Mail certification is optional.)

I hereby certify that this Transmittal Letter and the papers indicated as being transmitted therewith is being deposited with the United States Postal Service on this date June 11, 2001, in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EL712547800US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

Sarah Kennedy

(type or print name of person mailing paper)

Signature of person mailing paper

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. § 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

***WARNING:** Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. § 1.10(b).*
*"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.*

NOTE: To avoid abandonment of the application, the applicant shall furnish to the USPTO, not later than 20 months from the priority date: (1) a copy of the international application, unless it has been previously communicated by the International Bureau or unless it was originally filed in the USPTO; and (2) the basic national fee (see 37 C.F.R. § 1.492(a)). The 30-month time limit may not be extended. 37 C.F.R. § 1.495.

WARNING: *Where the items are those which can be submitted to complete the entry of the international application into the national phase are subsequent to 30 months from the priority date the application is still considered to be in the international state and if mailing procedures are utilized to obtain a date the express mail procedure of 37 C.F.R. § 1.10 must be used (since international application papers are not covered by an ordinary certificate of mailing—See 37 C.F.R. § 1.8.*

NOTE: Documents and fees must be clearly identified as a submission to enter the national state under 35 U.S.C. § 371 otherwise the submission will be considered as being made under 35 U.S.C. § 111. 37 C.F.R. § 1.494(f).

I. Applicant herewith submits to the United States Elected Office (EO/US) the following items under 35 U.S.C. § 371:

a. ☒ This express request to immediately begin national examination procedures (35 U.S.C. § 371(f)).

b. ☐ The U.S. National Fee (35 U.S.C. § 371(c)(1)) and other fees (37 C.F.R. § 1.492) as indicated below:

09/857937

JC03 Rec'd PCT/PTO 11 JUN 2001

2. Fees

CLAIMS FEE	(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) CALCULATIONS
☒*	TOTAL CLAIMS	17 -20=	0	× $18.00=	$ 0
	INDEPENDENT CLAIMS	1 -3=	0	× $80.00=	0
	MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ $270.00	
BASIC FEE**	☐ U.S. PTO WAS INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where an International preliminary examination fee as set forth in § 1.482 has been paid on the international application to the U.S. PTO: ☐ and the international preliminary examination report states that the criteria of novelty, inventive step (non-obviousness) and industrial activity, as defined in PCT Article 33(1) to (4) have been satisfied for all the claims presented in the application entering the national stage (37 C.F.R. § 1.492(a)(4)) ..... $100.00 ☐ and the above requirements are not met (37 C.F.R. § 1.492(a)(1)) ..... $690.00 ☒ U.S. PTO WAS NOT INTERNATIONAL PRELIMINARY EXAMINATION AUTHORITY Where no international preliminary examination fee as set forth in § 1.482 has been paid to the U.S. PTO, and payment of an international search fee as set forth in § 1.445(a)(2) to the U.S. PTO: ☐ has been paid (37 C.F.R. § 1.492(a)(2)) ..... $710.00 ☐ has not been paid (37 C.F.R. § 1.492(a)(3)) ..... $1000.00 ☒ where a search report on the international application has been prepared by the European Patent Office or the Japanese Patent Office (37 C.F.R. § 1.492(a)(5)) $860.00				$860.00
	Total of above Calculations				= $860.00
SMALL ENTITY	Reduction by 1/2 for filing by small entity, if applicable. Affidavit must be filed also. (note 37 C.F.R. § 1.9, 1.27, 1.28)				-
	Subtotal				$860.00
	Total National Fee				$ 860.00
	Fee for recording the enclosed assignment document $40.00 (37 C.F.R. § 1.21(h)). (See Item 13 below). See attached "ASSIGNMENT COVER SHEET".				
TOTAL	Total Fees enclosed				$860.00

*See attached Preliminary Amendment Reducing the Number of Claims.

☒ Attached is a ☒ check ☐ money order in the amount of $ 860.00

☒ Authorization is hereby made to charge the amount of $ _____

☒ to Deposit Account No. 19-0079

☐ to Credit card as shown on the attached credit card information authorization form PTO-2038.

WARNING: *Credit card information should **not** be included on this form as it may become public.*

☒ Charge any additional fees required by this paper or credit any overpayment in the manner authorized above.

A duplicate of this paper is attached.

****WARNING:*** *"To avoid abandonment of the application the applicant shall furnish to the United States Patent and Trademark Office not later than the expiration of 30 months from the priority date: * * * (2) the basic national fee (see § 1.492(a)). The 30-month time limit may not be extended." 37 C.F.R. § 1.495(b).*

WARNING: *If the translation of the international application and/or the oath or declaration have not been submitted by the applicant within thirty (30) months from the priority date, such requirements may be met within a time period set by the Office. 37 C.F.R. § 1.495(b)(2). The payment of the surcharge set forth in § 1.492(e) is required as a condition for accepting the oath or declaration later than thirty (30) months after the priority date. The payment of the processing fee set forth in § 1.492(f) is required for acceptance of an English translation later than thirty (30) months after the priority date. Failure to comply with these requirements will result in abandonment of the application. The provisions of § 1.136 apply to the period which is set. Notice of Jan. 3, 1993, 1147 O.G. 29 to 40.*

3. ☒ A copy of the International application as filed (35 U.S.C. § 371(c)(2)):

NOTE: Section 1.495 (b) was amended to require that the basic national fee and a copy of the international application must be filed with the Office by 30 months from the priority date to avoid abandonment. "The International Bureau normally provides the copy of the international application to the Office in accordance with PCT Article 20. At the same time, the International Bureau notifies applicant of the communication to the Office. In accordance with PCT Rule 47.1, that notice shall be accepted by all designated offices as conclusive evidence that the communication has duly taken place. Thus, if the applicant desires to enter the national stage, the applicant normally need only check to be sure the notice from the International Bureau has been received and then pay the basic national fee by 30 months from the priority date." Notice of Jan. 7, 1993, 1147 O.G. 29 to 40, at 35-36. See item 14c below.

a. ☒ is transmitted herewith.

b. ☐ is not required, as the application was filed with the United States Receiving Office.

c. ☐ has been transmitted

i. ☐ by the International Bureau.
Date of mailing of the application (from form PCT/1B/308):
_____.

ii. ☐ by applicant on _____. *(Date)*

4. ☒ A translation of the International application into the English language (35 U.S.C. § 371(c)(2)):

a. ☐ is transmitted herewith.

b. ☒ is not required as the application was filed in English.

c. ☐ was previously transmitted by applicant on _____. *(Date)*

d. ☐ will follow.

5. ☒ Amendments to the claims of the International application under PCT Article 19 (35 U.S.C. § 371(c)(3)):

NOTE: The Notice of January 7, 1993 points out that 37 C.F.R. § 1.495(a) was amended to clarify the existing and continuing practice that PCT Article 19 amendments must be submitted by 30 months from the priority date and this deadline may not be extended. The Notice further advises that: "The failure to do so will not result in loss of the subject matter of the PCT Article 19 amendments. Applicant may submit that subject matter in a preliminary amendment filed under section 1.121. In many cases, filing an amendment under section 1.121 is preferable since grammatical or idiomatic errors may be corrected." 1147 O.G. 29-40, at 36.

a. ☐ are transmitted herewith.

b. ☐ have been transmitted

i. ☐ by the International Bureau.
Date of mailing of the amendment (from form PCT/1B/308):
_____.

ii. ☐ by applicant on _____. *(Date)*

c. ☒ have not been transmitted as

i. ☒ applicant chose not to make amendments under PCT Article 19.
Date of mailing of Search Report (from form PCT/ISA/210.):
6 April 2000

ii. ☐ the time limit for the submission of amendments has not yet expired. The amendments or a statement that amendments have not been made will be transmitted before the expiration of the time limit under PCT Rule 46.1.

6. ☐ A translation of the amendments to the claims under PCT Article 19 (38 U.S.C. § 371(c)(3)):

a. ☐ is transmitted herewith.

b. ☐ is not required as the amendments were made in the English language.

c. ☒ has not been transmitted for reasons indicated at point 5(c) above.

7. ☒ A copy of the international examination report (PCT/IPEA/409)

☒ is transmitted herewith.

☐ is not required as the application was filed with the United States Receiving Office.

8. ☒ Annex(es) to the international preliminary examination report

a. ☒ is/are transmitted herewith.

b. ☐ is/are not required as the application was filed with the United States Receiving Office.

9. ☒ A translation of the annexes to the international preliminary examination report

a. ☐ is transmitted herewith.

b. ☒ is not required as the annexes are in the English language.

10. ☒ An oath or declaration of the inventor (35 U.S.C. § 371(c)(4)) complying with 35 U.S.C. § 115

a. ☐ was previously submitted by applicant on _____.
Date

b. ☒ is submitted herewith, and such oath or declaration

i. ☒ is attached to the application.

ii. ☐ identifies the application and any amendments under PCT Article 19 that were transmitted as stated in points 3(b) or 3(c) and 5(b); and states that they were reviewed by the inventor as required by 37 C.F.R. § 1.70.

c. ☒ will follow.

II. Other document(s) or information included:

11. ☒ An International Search Report (PCT/ISA/210) or Declaration under PCT Article 17(2)(a):

a. ☒ is transmitted herewith.

b. ☐ has been transmitted by the International Bureau.
Date of mailing (from form PCT/IB/308): _____.

c. ☐ is not required, as the application was searched by the United States International Searching Authority.

d. ☐ will be transmitted promptly upon request.

e. ☐ has been submitted by applicant on _____.
Date

12. ☒ An Information Disclosure Statement under 37 C.F.R. §§ 1.97 and 1.98:

a. ☒ is transmitted herewith.

Also transmitted herewith is/are:

☒ Form PTO-1449 (PTO/SB/08A and 08B).

☒ Copies of citations listed.

b. ☐ will be transmitted within THREE MONTHS of the date of submission of requirements under 35 U.S.C. § 371(c).

c. ☐ was previously submitted by applicant on _____.
Date

13. ☐ An assignment document is transmitted herewith for recording.

A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

_____

_____

_____

14. ☒ Additional documents:

a. ☒ Copy of request (PCT/RO/101)

b. ☒ International Publication No. WO 00/35711

i. ☒ Specification, claims and drawing

ii. ☐ Front page only

c. ☒ Preliminary amendment (37 C.F.R. § 1.121)

d. ☒ Other

Form PCT/IB/304; Form PCT/IPEA/402; Form PCT/IB/332

15. ☒ The above checked items are being transmitted

a. ☒ before 30 months from any claimed priority date.

b. ☐ after 30 months.

16. ☐ Certain requirements under 35 U.S.C. § 371 were previously submitted by the applicant on _____, namely:

AUTHORIZATION TO CHARGE ADDITIONAL FEES

WARNING: *Accurately count claims, especially multiple dependant claims, to avoid unexpected high charges if extra claims are authorized.*

NOTE: "A written request may be submitted in an application that is an authorization to treat any concurrent or future reply, requiring a petition for an extension of time under this paragraph for its timely submission, as incorporating a petition for extension of time for the appropriate length of time. An authorization to charge all required fees, fees under § 1.17, or all required extension of time fees will be treated as a constructive petition for an extension of time in any concurrent or future reply requiring a petition for an extension of time under this paragraph for its timely submission. Submission of the fee set forth in § 1.17(a) will also be treated as a constructive petition for an extension of time in any concurrent reply requiring a petition for an extension of time under this paragraph for its timely submission." 37 C.F.R. § 1.136(a)(3).

NOTE: "Amounts of twenty-five dollars or less will not be returned unless specifically requested within a reasonable time, nor will the payer be notified of such amounts; amounts over twenty-five dollars may be returned by check or, if requested, by credit to a deposit account." 37 C.F.R. § 1.26(a).

☒ Please charge, in the manner authorized above, the following additional fees that may be required by this paper and during the entire pendency of this application:

☒ 37 C.F.R. § 1.492(a)(1), (2), (3), and (4) (filing fees)

WARNING: *Because failure to pay the national fee within 30 months without extension (37 C.F.R. § 1.495(b)(2)) results in abandonment of the application, it would be best to always check the above box.*

☒ 37 C.F.R. § 1.492(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 C.F.R. § 1.492(d)), it might be best not to authorize the PTO to charge additional claim fees, except possible when dealing with amendments after final action.

☒ 37 C.F.R. § 1.17 (application processing fees)

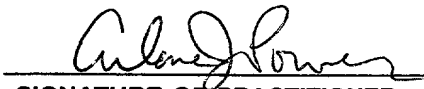
☒ 37 C.F.R. § 1.17(a)(1)–(5) (extension fees pursuant to § 1.136(a).

☐ 37 C.F.R. § 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 C.F.R. § 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 C.F.R. § 1.311(b).

NOTE: 37 C.F.R. § 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying . . . issue fee." From the wording of 37 C.F.R. § 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

☐ 37 C.F.R. § 1.492(e) and (f) (surcharge fees for filing the declaration and/or filing an English translation of an International Application later than 30 months after the priority date).



SIGNATURE OF PRACTITIONER

Arlene J. Powers

(type or print name of practitioner)

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Customer No.:

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT:	Dennis et al.	**GROUP:**	Unknown
SERIAL NO:	Unknown	**EXAMINER:**	Unknown
FILED:	Herewith		
FOR:	WEBBING TIE DOWN ASSEMBLY		

Assistant Commissioner of Patents
Washington, D.C. 20231
Sir:

PRELIMINARY AMENDMENT

Preliminary to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION:

Page 2, after line 5, insert therefore, as a new paragraph -- The present invention is defined in accompanying claim 1. --;

line 7, delete "In a first aspect, the" and insert therefore -- The --;

line 7, after the word invention, insert -- thus --;

line 10, after the word webbing, insert -- In a preferred embodiment the clamping surfaces are mutually opposed complementary curved surfaces.

delete lines 12-14.

line 16, delete "second aspect, the present invention provides a" and insert therefore -- preferred arrangement, the --;

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited on the date shown below in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number EL712547800US addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Sarah Kennedy

Date: 6/11/01

line 17, delete "comprising" and insert therefore -- comprises --;

delete line 21 and insert therefore -- Moreover, in the preferred embodiment the webbing assembly comprises --;

line 26, delete "Embodiments of the" and insert therefore -- The --.

Page 3, line 5, delete "of the present invention";

line 19, delete "of the present invention".

Page 5, line 16, after the word first, insert -- unclaimed --;

line 17, after the word embodiment, delete "of the present invention".

Page 6, line 15, delete "In accordance with the present invention, the" and insert therefore -- The --.

Page 7, lines 14-15, delete "of the present invention".

Page 8, line 21, delete "of the present invention" and insert therefore -- , also unclaimed, --.

Page 10, line 15, delete "of" and insert therefore -- in accordance with --.

Page 11, line 22, delete "The" and insert therefore -- In accordance with the present invention, the --.

Page 12, line 20, after the word embodiment, delete "of" and insert therefore -- in accordance with --;

line 24, delete "described embodiments" and insert therefore -- preferred embodiment --;

delete "are" and insert therefore -- is --.

IN THE CLAIMS:

Please cancel the following claims without prejudice or disclaimer:

Please cancel Claims 1, 4 and 5.

Please amend the claims as follows:

2. (Amended) A webbing tie down assembly as claimed in claim [1] 18 in which at least one of the first and second clamping members has a supporting surface, substantially opposite the clamping surface, the supporting surface being arranged to support webbing.

6. (Amended) A webbing tie down assembly as claimed in claim [5] 18, wherein the shaft is cylindrical.

7. (Amended) A webbing tie down assembly as claimed in claim [5 or claim 6] 2, wherein the [other clamping member includes a] supporting surface[, opposite to the clamping surface,] is provided on the other clamping member for supporting webbing wrapped therearound, the supporting surface being configured to prevent undue tension on webbing supported thereby.

8. (Amended) A webbing tie down assembly as claimed in claim 7, wherein the [first] inner frame comprises a first pair of substantially parallel inner plates, and the [second] outer frame comprises a second pair of substantially parallel outer plates, the assembly further comprising a roller shaft, wherein the first pair of substantially parallel inner plates is mounted on the roller shaft to pivot between the first and second positions, and wherein in the first position, the inner plates of the first frame lie between the outer plates of the second frame, and wherein the supporting surface extends within the boundary of the inner plates in the first position.

11. (Amended) A webbing tie down assembly as claimed in claim 9[or claim 10], in which [the roller shaft extends through] the tensioning mechanism includes a pair of slots in respective ones of either the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, the roller shaft extending through the pair of slots and [is] being rigidly mounted to the other of the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, so that the first frame can be displaced relative to the second frame along the length of the slots.

13. (Amended) A webbing tie down assembly as claimed in claim 11[or claim 12], in which the roller shaft forms one of the first and second clamping members and the other of the first and second clamping members is rigidly secured between the parallel plates of the frame carrying slots.

14. (Amended) A webbing tie down assembly as claimed in [any preceding claim] claim 18, in which the assembly has a first end and a second end, the first end carrying a hook mounted to the first or second frame for attachment to an object to be tied down, the hook secured to the first or second frame at a pair of securing points.

17. (Amended) A webbing tie down assembly as claimed in claim 15[or claim 16], in which the supporting surface adjacent the second end of the assembly has a minimum radius of curvature of 6.35mm.

Please add the following new claim:

18. A webbing tie down assembly, comprising:

an inner frame and an outer frame, the inner frame and the outer frame being arranged to support webbing therein and including a clamping mechanism comprising: a first clamping member supported by the inner frame and having a first clamping surface, and a second clamping member supported by the outer frame and having a second clamping surface, the inner frame being mounted with respect to the outer frame for movement between a first position in which the first and second clamping surfaces are substantially together for clamping webbing therebetween, and a second position in which the clamping surfaces are apart for allowing webbing to slide therethrough; and further including a tensioning mechanism, for disengaging the first and second clamping surfaces when the inner frame and outer frame are in the first position to permit the webbing to slide therebetween to enable tensioning of the webbing,

characterized in that one of the first and second clamping members comprises a shaft, and the clamping surface of the other clamping member has a complementary curvature, so that the clamping surfaces of the first and second clamping members lie substantially parallel in the first position so that a clamping force on the webbing is distributed over a relatively large surface area of the webbing.

IN THE ABSTRACT:

Attached hereto is one (1) sheet of Abstract.

REMARKS

The specification and the claims have been amended to include the Article 34 amendments of the PCT application and to delete the multiple dependencies. Marked-up and clean copies of the specification pages and a clean copy of the claims are attached hereto. Examination on the merits is respectfully requested.

Respectfully submitted,

Arlene J. Powers
Registration No. 35,985
Samuels, Gauthier & Stevens
225 Franklin Street, Suite 3300
Boston, Massachusetts 02110
Telephone: (617) 426-9180
Extension 110

2. (Amended) A webbing tie down assembly as claimed in claim 18, in which at least one of the first and second clamping members has a supporting surface, substantially opposite the clamping surface, the supporting surface being arranged to support webbing.

3. A webbing tie down assembly as claimed in claim 2, in which the or each supporting surface is smoothly curved to allow webbing to slide thereon.

6. (Amended) A webbing tie down assembly as claimed in claim 18, wherein the shaft is cylindrical.

7. (Amended) A webbing tie down assembly as claimed in claim 2, wherein the supporting surface is provided on the other clamping member for supporting webbing wrapped therearound, the supporting surface being configured to prevent undue tension on webbing supported thereby.

8. (Amended) A webbing tie down assembly as claimed in claim 7, wherein the inner frame comprises a first pair of substantially parallel inner plates, and the outer frame comprises a second pair of substantially parallel outer plates, the assembly further comprising a roller shaft, wherein the first pair of substantially parallel inner plates is mounted on the roller shaft to pivot between the first and second positions, and wherein in the first position, the inner plates of the first frame lie between the outer plates of the second frame, and wherein the supporting surface extends within the boundary of the inner plates in the first position.

9. A webbing tie down assembly as claimed in claim 8, further comprising a latching mechanism, for securing the inner plates with respect to the outer plates in the first position.

10. A webbing tie down assembly as claimed in claim 9, wherein the first pair of substantially parallel inner plates are linked together by a handle for movement between the first and second positions.

11. (Amended) A webbing tie down assembly as claimed in claim 9, in which the tensioning mechanism includes a pair of slots in respective ones of either the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, the roller shaft extending through the pair of slots and being rigidly mounted to the other of the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, so that the first frame can be displaced relative to the second frame along the length of the slots.

12. A webbing tie down assembly as claimed in claim 11, in which the slots are curved.

13. (Amended) A webbing tie down assembly as claimed in claim 11, in which the roller shaft forms one of the first and second clamping members and the other of the first and second clamping members is rigidly secured between the parallel plates of the frame carrying the slots.

14. (Amended) A webbing tie down assembly as claimed in claim 18, in which the assembly has a first end and a second end, the first end carrying a hook mounted to the first

or second frame for attachment to an object to be tied down, the hook secured to the first or second frame at a pair of securing points.

15. A webbing tie down assembly as claimed in claim 14, in which webbing enters and exits the assembly at the second end thereof, the webbing being wrapped around at least one supporting surface and between the clamping surfaces of the first and second clamping members.

16. A webbing tie down assembly as claimed in claim 15, in which the at least one supporting surface includes one or more pulley shafts arranged within the assembly to distribute the load of the webbing whilst spacing apart the surfaces thereof.

17. (Amended) A webbing tie down assembly as claimed in claim 15, in which the supporting surface adjacent the second end of the assembly has a minimum radius of curvature of 6.35mm.

18. A webbing tie down assembly, comprising:

an inner frame and an outer frame, the inner frame and the outer frame being arranged to support webbing therein and including a clamping mechanism comprising: a first clamping member supported by the inner frame and having a first clamping surface, and a second clamping member supported by the outer frame and having a second clamping surface, the inner frame being mounted with respect to the outer frame for movement between a first position in which the first and second clamping surfaces are substantially together for clamping webbing therebetween, and a second position in which the clamping surfaces are apart for allowing webbing to slide therethrough; and further including a

tensioning mechanism, for disengaging the first and second clamping surfaces when the inner frame and outer frame are in the first position to permit the webbing to slide therebetween to enable tensioning of the webbing,

characterized in that one of the first and second clamping members comprises a shaft, and the clamping surface of the other clamping member has a complementary curvature, so that the clamping surfaces of the first and second clamping members lie substantially parallel in the first position so that a clamping force on the webbing is distributed over a relatively large surface area of the webbing.

09/857937
JC03 Rec'd PCT/PTC 11 JUN 2001

ABSTRACT

A webbing tie down assembly comprises an inner frame, preferably in the form of a pair of parallel inner plates, supporting a first clamping member having a first clamping surface, and an outer frame preferably in the form of a pair of parallel outer plates supporting a second clamping member having a second clamping surface. The inner frame and the outer frame are arranged to support webbing therein, the inner frame being mounted with respect to the outer frame for movement between a first position in which the first and second clamping surfaces are substantially together for clamping the webbing therebetween, and a second position in which the clamping surfaces are apart for allowing the webbing to slide therethrough. The assembly is characterised in that the first and second clamping surfaces are configured to provide substantially parallel surfaces in said first position so that a clamping force on the webbing is distributed over a relatively large surface area of the webbing.

The present invention aims to provide a webbing tie down assembly which achieves simple clamping and tensioning of the webbing, which can sustain increased loads compared with the prior art preferably enabling webbing ties to be used to permanently secure a helicopter to the deck of a ship, thereby obviating the need for securing chains.

The present invention is defined in accompanying claim 1.

The present invention thus provides a webbing assembly in which the webbing is clamped between a pair of substantially parallel clamping surfaces so that the clamping force on the webbing is distributed over a large surface area of the webbing. In a preferred embodiment the clamping surfaces are mutually opposed complementary curved surfaces.

In a preferred arrangement, the webbing assembly comprises a webbing clamping mechanism in which the webbing is wrapped around a plurality of pulley-like shafts which are arranged to uniformly distribute a load applied to the webbing when under tension.

Moreover, in the preferred embodiment the webbing assembly comprises a webbing clamping mechanism, in which guide surfaces for the webbing are provided which are arranged to prevent the webbing from coming into contact with itself when the mechanism is in use.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1A is a schematic side view of a prior art webbing tie down assembly;

Figure lB is a schematic plan view of the prior art webbing tie down assembly of Figure 1A;

Figure 2 is a schematic view showing the use a webbing tie down assembly to secure a helicopter to the deck of a ship;

Figure 3 is a side view of a webbing tie down assembly forming a first embodiment;

Figure 3a is a schematic side view of a latching mechanism used with the webbing tie down assembly of Figure 3;

Figure 4 is a perspective view of the webbing tie down assembly of Figure 3;

Figure 5 is a perspective view of the inner parts of the webbing tie down assembly of Figure 3;

Figures 6a to c are schematic side views showing the embodiment of Figure 3 at various positions in use;

Figure 7 is a side view of a webbing tie down assembly forming a second embodiment;

Figure 8 is a perspective view of the webbing tie down assembly of Figure 7;

Figures 9a to c show the embodiment of Figure 7 in different positions in use;

Figure 10 is a side view of a webbing tie down assembly forming a third and preferred embodiment of the present invention;

Figure 10a is an enlarged side view of the clamping mechanism of the webbing tie down assembly of Figure 10;

extending slots 27 therein, is used to secure the inner plates 5 in the closed position with respect to the outer plates 3 by engagement with notches 29 in the outer plates 3.

In the closed position, the webbing 15 is clamped between the notch 10 in the clamping member 9 and the surface of the roller 7. From the clamped position, tension can be applied to the webbing 15 by pulling on the free end of the webbing. The pulling force is sufficient to displace the roller shaft 7 downwardly within the slots 11 in the inner plates ***5,*** to remove the clamping force applied to the webbing and allow it to pass freely through the assembly between the clamping member 9 and the roller 7, without disengaging the latching bar 17 from the closed position.

Figure 2 illustrates one manner of use of the known webbing tie down assembly when securing a helicopter to the deck of a ship. This and other manners of use are possible with the webbing tie down assembly of the present invention.

Figures 3 to 5 show a webbing tie down assembly according to a first unclaimed embodiment. The assembly is generally similar in construction to the prior art assembly shown in Figures 1A and lB.

The assembly thus comprises a pair of parallel inner plates 105 which are linked together by a handle 106 and are together pivotally mounted on a shaft 107 secured between a pair of parallel outer plates 103. The shaft 107 extends through a slot 111 in each of the inner plates 105 and is rigidly mounted to the outer plates 103.

A pair of securing points 123 are provided on the outer plates at a front end of the assembly for mounting a hook (not shown). The use ofa pair of securing points prevents rotation of the hook relative to the outer plates 103.

A latching mechanism, shown in detail in Figure 3a, is provided to lock the inner

plates 105 in the closed position (as shown in Figure 3) relative to the outer plates 103. The latching mechanism comprises a latching bar 117 extending transversely between the inner plates 105 through longitudinally extending slots 127 in the inner plates 105 which cooperate with notches 129 in the outer plates 103 in the closed position. The latching bar 117 is biased by means of a leaf spring towards the front end of the slots 127 for engagement with the notches 129 in the outer plates 103 but can be released from engagement by sliding the latching bar 117 rearwardly along the slots 127 against the biasing force.

The clamping mechanism comprises an upper clamping member 119a mounted between the inner plates 105, and a lower clamping member 119b mounted between the outer walls 103. The clamping members 119a, 119b are mounted on the rear side of the assembly relative to the roller shaft 107.

The clamping members 119a, 119b provide respective mutually opposing generally planar clamping surfaces 120a, 120b, for clamping a relatively large surface area of the webbing 115, which passes between the two clamping surfaces 1 20a, 120b. It should be noted that the clamping members 119a, 119b have smooth surfaces and rounded edges to allow the webbing 115 to slide around the surfaces of the clamping members easily, without catching or tearing, as described below.

A pair of transversely extending pulley shafts 121a, 121b are mounted between the inner plates 105 in vertical alignment. It should be noted that the pulley shafts 121a, 121b are provided on the front side of the assembly relative to the roller shaft 107, and are spaced equidistantly therefrom.

The pulley shafts 121a, 121b and roller shaft 107 are preferably made from hard drawn stainless steel, as is a load bearing shaft 124 mounting the upper clamping member 119a to the inner plates 105. The shaft 124 bears a large proportion of the load, as

described below.

Webbing 115 is passed through the assembly as shown in Figure 3. In particular, the free end of the webbing 115a is inserted into the rear end of the assembly between the inner plates 105, wrapped around the front sides of the pulley shafts 121a, 121b, over the upper surface of the upper clamping member, around the curved rear of the upper clamping member where the load bearing shaft 124 is positioned, between the clamping surfaces of the first and second clamping members 119a, 119b, around the roller shaft 107 and then back out through the rear end of the assembly. It should be noted that the pulley shafts 121a, 121b and clamping members 119a, 119b are arranged to uniformly distribute any load applied to the webbing 115 whilst keeping the surfaces of the webbing apart.

Figures 6a to c show the various positions of the first embodiment, in use.

Referring to Figure 6c, the latching bar 117 is disengaged from the notches 129 within the outer plates 103, so that the inner plates 105 can be pivoted about the roller shaft 107 by lifting of the handle 106 to the illustrated open position. In this position, the webbing 115 is neither clamped nor under tension, and is free to run around the pulley mechanism and between the clamping surfaces to enable the hook 101 to be released from, or secured to, for example, a helicopter fitting as shown in Figure 2.

Once the hook 101 has been secured to the helicopter fitting, the handle 106 is lowered to rotate the inner plates back around shaft 107 to the closed position as shown in Figure 3 and the latching bar 117 engages the notches in the outer plates to retain the inner plates in the closed position relative to the outer plates. It is then necessary to pull taut the webbing 115 which extends between the deck and the helicopter, and this is achieved by simply pulling on the free end 11 5a as shown by the arrows in Figure 6a to tension the webbing 115. The force applied to the free end 115a of the webbing exerts a

force on the roller shaft 107 which displaces the roller shaft 107 downwardly within the slots 111 in the inner plates 105. The ends of the roller shaft 107 are secured to the outer plates 103, which mount the lower clamping member 119b, so that the outer plates 103 and lower clamping member 119b are also displaced downwardly, thus disengaging the clamping surfaces of the upper and lower clamping members and permitting the webbing 115 to move therebetween. Thus, the webbing 115 can be pulled through the assembly to apply tension to the webbing 115 and thus remove any slack between deck and helicopter.

Figure 6b shows the forces applied to the webbing 115 when the assembly is in use. In particular, when the helicopter is secured to the deck of a ship, the movement of the deck will cause the helicopter to sway, and an increased load to be applied to the webbing 115. The load is particularly applied to the shaft 124 securing the upper clamping member 119a, but is also distributed over the pulley shafts 121a, 121b. In this position, the clamping surfaces 120a, 120b are brought together so that they lie essentially parallel and apply clamping pressure to the webbing 115 as shown. This clamping effect is achieved because roller shaft 107 moves upwardly within the slots 111 in the inner plates 105 to align the clamping surfaces 120a, 120b parallel with each other with the distance between them slightly less than the thickness of the webbing.

A second embodiment, also unclaimed, is shown in Figures 7 to 9. The structural features of this embodiment are generally the same as the first embodiment and the following description relates mainly to the different features of the second embodiment.

In this second embodiment, the roller shaft 207 is located in slots 211 in the outer plates 203, which slots 211 extend in an arc generally centred about the axis of the latching bar 217. The slots 211 thus permit displacement of the inner plates 205 within the outer plates 203 whereas in the first embodiment the outer plates are displaced relative to the inner plates.

In the second embodiment, the upper clamping member 219a has a larger surface area than in the first embodiment to provide a larger contact surface and distribute the clamping force across a larger surface area of the webbing 215.

The materials and gauge of the components of the assembly are chosen to be lighter in weight than the first embodiment, that is, components are formed from aluminium alloys wherever possible and narrower gauge components are employed. It will be appreciated that the assembly should be as light as possible for an individual to carry several at a time, whilst meeting the functional load-bearing requirements. Thus, the described assemblies need to balance the features of heavy and relatively thick bard drawn stainless steel shafts necessary to perform load bearing functions, and more lighter weight material.

Figures 10 to 12 show a webbing tie down assembly according to a third and preferred embodiment in accordance with the present invention. Like the first embodiment, the assembly of the third embodiment is similar in construction to the prior art assembly shown in Figures 1A and lB, but dimensioned on a larger scale and with higher grade materials to achieve the increased load bearing requirements.

In particular, the assembly comprises a pair of parallel inner plates 305 which are linked together by a handle 306 and are together pivotally mounted on a roller shaft 307 secured between a pair of parallel outer plates 303. The shaft 307 extends through a slot 311 in each of the inner plates 305 and is rigidly mounted to the outer plates 303.

A pair of securing points 323 are provided on the outer plates at a front end of the assembly which mount a hook 301. The use of a pair of securing points prevents rotation of the hook relative to the outer plates 303.

As in the first and second embodiments, a latching mechanism is provided to lock

the inner plates 305 in the closed position relative to the outer plates 303. The latching mechanism comprises a latching bar 317 extending transversely between the inner plates 305 through longitudinally extending slots 327 in the inner plates 305 which cooperate with notches 329 in the outer plates 303 in the closed position. The latching bar 317 is biased by means of a leaf spring towards the front end of the slots 327 for engagement with the notches 329 in the outer plates 303 but can be released from engagement by sliding the latching bar 317 rearwardly along the slots 327 against the biasing force.

The clamping mechanism of the third embodiment differs from the clamping mechanism of the first and second embodiments. In particular, instead of providing planar surfaces for clamping the webbing over a relatively large surface area, the third embodiment incorporates complementary curved clamping surfaces for clamping the webbing.

Referring to Figure 10, the clamping mechanism comprises an upper clamping member 309 mounted between the inner plates 305, and the roller shaft 307 forms the lower clamping member. The shape of the upper clamping member 309 is particularly important for the clamping function and will be described in detail hereinafter, with reference to Figure 10a.

In accordance with the present invention, the clamping surface 320 of the upper clamping member 309, which opposes the surface of roller shaft 307, is formed with a curvature complementary to the curvature of the shaft such that when webbing 315 is clamped between the clamping members 307, 309 the clamping surfaces lie substantially parallel, separated by a distance slightly less than the normal thickness of the webbing, thus applying a generally uniform clamping force over a large surface area of the webbing.

The remainder of the surface of the upper clamping member 309 is smoothly curved to allow the webbing 315 to slide around the clamping member without catching

or tearing. It is particularly important that the curvature of the front end surface 309a of the upper clamping member 309 has a sufficiently large radius of curvature at the point r in Figure 10a to prevent undue tension on the webbing which can lead to wear. In an example, the minimum radius of curvature r is five eighths of an inch (approx 15.9mm) for the dimensions of the assembly. The minimum radius of curvature at point r is 6.35mm as illustrated in Figure 10a. However, it is also advantageous if the upper surface of the upper clamping member extends below the level of the inner plates 305, so that the inner plates act to guide the webbing 315 therebetween as it passes over the upper clamping member 309, without the risk of the webbing "riding up" and catching on one of the inner plates.

Webbing 315 is passed through the assembly as shown in Figure 10. In particular, the free end of the webbing 31 5a is inserted into the rear end of the assembly between the inner plates 305, passed beyond the front of the shaft 307 and then over upper clamping member 309 and rearwardly over the upper surface of the upper clamping member 309, then forwardly between the clamping surface 320 of the upper clamping member 309 and the roller shaft 307, around the front of the roller shaft 307 and then back out through the rear end of the assembly, as shown.

Figures 12a to 12c show the various positions of the third embodiment in accordance with the present invention, in use, and will not be described since they correspond to the positions shown in Figures 6a to 6c of the first embodiment described above.

The preferred embodiment of the present invention is designed for use with relatively thick polyester webbing having a breaking force in excess of 15000lb. The thickness of the webbing is not however critical, and the webbing tie down assembly has been found to work effectively with a variety of webbing thicknesses.

It is anticipated that the webbing tie down assembly of the present invention can be

The present invention aims to provide a webbing tie down assembly which achieves simple clamping and tensioning of the webbing, which can sustain increased loads compared with the prior art preferably enabling webbing ties to be used to permanently secure a helicopter to the deck of a ship, thereby obviating the need for securing chains.

The present invention is defined in accompanying claim 1.

~~[In a first aspect, the]~~ The present invention thus provides a webbing assembly in which the webbing is clamped between a pair of substantially parallel clamping surfaces so that the clamping force on the webbing is distributed over a large surface area of the webbing. In a preferred embodiment the clamping surfaces are mutually opposed complementary curved surfaces.

~~[In some embodiments the clamping surfaces are flat but in a preferred embodiment the clamping surfaces are mutually opposed complementary curved surfaces.]~~

In a ~~[second aspect, the present invention provides a]~~ preferred arrangement, the webbing assembly ~~[comprising]~~ comprises a webbing clamping mechanism in which the webbing is wrapped around a plurality of pulley-like shafts which are arranged to uniformly distribute a load applied to the webbing when under tension.

~~[In a third aspect, the present invention provides a webbing assembly comprising]~~ Moreover, in the preferred embodiment the webbing assembly comprises a webbing clamping mechanism, in which guide surfaces for the webbing are provided which are arranged to prevent the webbing from coming into contact with itself when the mechanism is in use.

~~[Embodiments of the]~~ The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1A is a schematic side view of a prior art webbing tie down assembly;

Figure 1B is a schematic plan view of the prior art webbing tie down assembly of Figure 1A;

Figure 2 is a schematic view showing the use a webbing tie down assembly to secure a helicopter to the deck of a ship;

Figure 3 is a side view of a webbing tie down assembly forming a first embodiment[~~ of the present invention~~];

Figure 3a is a schematic side view of a latching mechanism used with the webbing tie down assembly of Figure 3;

Figure 4 is a perspective view of the webbing tie down assembly of Figure 3;

Figure 5 is a perspective view of the inner parts of the webbing tie down assembly of Figure 3;

Figures 6a to c are schematic side views showing the embodiment of Figure 3 at various positions in use;

Figure 7 is a side view of a webbing tie down assembly forming a second embodiment[~~ of the present invention~~];

Figure 8 is a perspective view of the webbing tie down assembly of Figure 7;

Figures 9a to c show the embodiment of Figure 7 in different positions in use;

Figure 10 is a side view of a webbing tie down assembly forming a third and preferred embodiment of the present invention;

Figure 10a is an enlarged side view of the clamping mechanism of the webbing tie down assembly of Figure 10;

extending slots 27 therein, is used to secure the inner plates 5 in the closed position with respect to the outer plates 3 by engagement with notches 29 in the outer plates 3.

In the closed position, the webbing 15 is clamped between the notch 10 in the clamping member 9 and the surface of the roller 7. From the clamped position, tension can be applied to the webbing 15 by pulling on the free end of the webbing. The pulling force is sufficient to displace the roller shaft 7 downwardly within the slots 11 in the inner plates 5, to remove the clamping force applied to the webbing and allow it to pass freely through the assembly between the clamping member 9 and the roller 7, without disengaging the latching bar 17 from the closed position.

Figure 2 illustrates one manner of use of the known webbing tie down assembly when securing a helicopter to the deck of a ship. This and other manners of use are possible with the webbing tie down assembly of the present invention.

Figures 3 to 5 show a webbing tie down assembly according to a first unclaimed embodiment~~[of the present invention]~~. The assembly is generally similar in construction to the prior art assembly shown in Figures 1A and 1B.

The assembly thus comprises a pair of parallel inner plates 105 which are linked together by a handle 106 and are together pivotally mounted on a shaft 107 secured between a pair of parallel outer plates 103. The shaft 107 extends through a slot 111 in each of the inner plates 105 and is rigidly mounted to the outer plates 103.

A pair of securing points 123 are provided on the outer plates at a front end of the assembly for mounting a hook (not shown). The use of a pair of securing points prevents rotation of the hook relative to the outer plates 103.

A latching mechanism, shown in detail in Figure 3a, is provided to lock the inner

plates 105 in the closed position (as shown in Figure 3) relative to the outer plates 103. The latching mechanism comprises a latching bar 117 extending transversely between the inner plates 105 through longitudinally extending slots 127 in the inner plates 105 which cooperate with notches 129 in the outer plates 103 in the closed position. The latching bar 117 is biased by means of a leaf spring towards the front end of the slots 127 for engagement with the notches 129 in the outer plates 103 but can be released from engagement by sliding the latching bar 117 rearwardly along the slots 127 against the biasing force.

The clamping mechanism comprises an upper clamping member 119a mounted between the inner plates 105, and a lower clamping member 119b mounted between the outer walls 103. The clamping members 119a, 119b are mounted on the rear side of the assembly relative to the roller shaft 107.

~~[In accordance with the present invention, the~~] The clamping members 119a, 119b provide respective mutually opposing generally planar clamping surfaces 120a, 120b, for clamping a relatively large surface area of the webbing 115, which passes between the two clamping surfaces 120a, 120b. It should be noted that the clamping members 119a, 119b have smooth surfaces and rounded edges to allow the webbing 115 to slide around the surfaces of the clamping members easily, without catching or tearing, as described below.

A pair of transversely extending pulley shafts 121a, 121b are mounted between the inner plates 105 in vertical alignment. It should be noted that the pulley shafts 121a, 121b are provided on the front side of the assembly relative to the roller shaft 107, and are spaced equidistantly therefrom.

The pulley shafts 121a, 121b and roller shaft 107 are preferably made from hard drawn stainless steel, as is a load bearing shaft 124 mounting the upper clamping member 119a to the inner plates 105. The shaft 124 bears a large proportion of the load, as

described below.

Webbing 115 is passed through the assembly as shown in Figure 3. In particular, the free end of the webbing 115a is inserted into the rear end of the assembly between the inner plates 105, wrapped around the front sides of the pulley shafts 121a, 121b, over the upper surface of the upper clamping member, around the curved rear of the upper clamping member where the load bearing shaft 124 is positioned, between the clamping surfaces of the first and second clamping members 119a, 119b, around the roller shaft 107 and then back out through the rear end of the assembly. It should be noted that the pulley shafts 121a, 121b and clamping members 119a, 119b are arranged to uniformly distribute any load applied to the webbing 115 whilst keeping the surfaces of the webbing apart.

Figures 6a to c show the various positions of the first embodiment~~[of the present invention]~~, in use.

Referring to Figure 6c, the latching bar 117 is disengaged from the notches 129 within the outer plates 103, so that the inner plates 105 can be pivoted about the roller shaft 107 by lifting of the handle 106 to the illustrated open position. In this position, the webbing 115 is neither clamped nor under tension, and is free to run around the pulley mechanism and between the clamping surfaces to enable the hook 101 to be released from, or secured to, for example, a helicopter fitting as shown in Figure 2.

Once the hook 101 has been secured to the helicopter fitting, the handle 106 is lowered to rotate the inner plates back around shaft 107 to the closed position as shown in Figure 3 and the latching bar 117 engages the notches in the outer plates to retain the inner plates in the closed position relative to the outer plates. It is then necessary to pull taut the webbing 115 which extends between the deck and the helicopter, and this is achieved by simply pulling on the free end 115a as shown by the arrows in Figure 6a to tension the webbing 115. The force applied to the free end 115a of the webbing exerts a

force on the roller shaft 107 which displaces the roller shaft 107 downwardly within the slots 111 in the inner plates 105. The ends of the roller shaft 107 are secured to the outer plates 103, which mount the lower clamping member 119b, so that the outer plates 103 and lower clamping member 119b are also displaced downwardly, thus disengaging the clamping surfaces of the upper and lower clamping members and permitting the webbing 115 to move therebetween. Thus, the webbing 115 can be pulled through the assembly to apply tension to the webbing 115 and thus remove any slack between deck and helicopter.

Figure 6b shows the forces applied to the webbing 115 when the assembly is in use. In particular, when the helicopter is secured to the deck of a ship, the movement of the deck will cause the helicopter to sway, and an increased load to be applied to the webbing 115. The load is particularly applied to the shaft 124 securing the upper clamping member 119a, but is also distributed over the pulley shafts 121a, 121b. In this position, the clamping surfaces 120a, 120b are brought together so that they lie essentially parallel and apply clamping pressure to the webbing 115 as shown. This clamping effect is achieved because roller shaft 107 moves upwardly within the slots 111 in the inner plates 105 to align the clamping surfaces 120a, 120b parallel with each other with the distance between them slightly less than the thickness of the webbing.

A second embodiment~~[of the present invention]~~ , also unclaimed, is shown in Figures 7 to 9. The structural features of this embodiment are generally the same as the first embodiment and the following description relates mainly to the different features of the second embodiment.

In this second embodiment, the roller shaft 207 is located in slots 211 in the outer plates 203, which slots 211 extend in an arc generally centred about the axis of the latching bar 217. The slots 211 thus permit displacement of the inner plates 205 within the outer plates 203 whereas in the first embodiment the outer plates are displaced relative to the inner plates.

In the second embodiment, the upper clamping member 219a has a larger surface area than in the first embodiment to provide a larger contact surface and distribute the clamping force across a larger surface area of the webbing 215.

The materials and gauge of the components of the assembly are chosen to be lighter in weight than the first embodiment, that is, components are formed from aluminium alloys wherever possible and narrower gauge components are employed. It will be appreciated that the assembly should be as light as possible for an individual to carry several at a time, whilst meeting the functional load-bearing requirements. Thus, the described assemblies need to balance the features of heavy and relatively thick hard drawn stainless steel shafts necessary to perform load bearing functions, and more lighter weight material.

Figures 10 to 12 show a webbing tie down assembly according to a third and preferred embodiment [of] <u>in accordance with</u> the present invention. Like the first embodiment, the assembly of the third embodiment is similar in construction to the prior art assembly shown in Figures 1A and 1B, but dimensioned on a larger scale and with higher grade materials to achieve the increased load bearing requirements.

In particular, the assembly comprises a pair of parallel inner plates 305 which are linked together by a handle 306 and are together pivotally mounted on a roller shaft 307 secured between a pair of parallel outer plates 303. The shaft 307 extends through a slot 311 in each of the inner plates 305 and is rigidly mounted to the outer plates 303.

A pair of securing points 323 are provided on the outer plates at a front end of the assembly which mount a hook 301. The use of a pair of securing points prevents rotation of the hook relative to the outer plates 303.

As in the first and second embodiments, a latching mechanism is provided to lock

the inner plates 305 in the closed position relative to the outer plates 303. The latching mechanism comprises a latching bar 317 extending transversely between the inner plates 305 through longitudinally extending slots 327 in the inner plates 305 which cooperate with notches 329 in the outer plates 303 in the closed position. The latching bar 317 is biased by means of a leaf spring towards the front end of the slots 327 for engagement with the notches 329 in the outer plates 303 but can be released from engagement by sliding the latching bar 317 rearwardly along the slots 327 against the biasing force.

The clamping mechanism of the third embodiment differs from the clamping mechanism of the first and second embodiments. In particular, instead of providing planar surfaces for clamping the webbing over a relatively large surface area, the third embodiment incorporates complementary curved clamping surfaces for clamping the webbing.

Referring to Figure 10, the clamping mechanism comprises an upper clamping member 309 mounted between the inner plates 305, and the roller shaft 307 forms the lower clamping member. The shape of the upper clamping member 309 is particularly important for the clamping function and will be described in detail hereinafter, with reference to Figure 10a.

[The] <u>In accordance with the present invention, the</u> clamping surface 320 of the upper clamping member 309, which opposes the surface of roller shaft 307, is formed with a curvature complementary to the curvature of the shaft such that when webbing 315 is clamped between the clamping members 307, 309 the clamping surfaces lie substantially parallel, separated by a distance slightly less than the normal thickness of the webbing, thus applying a generally uniform clamping force over a large surface area of the webbing.

The remainder of the surface of the upper clamping member 309 is smoothly curved to allow the webbing 315 to slide around the clamping member without catching

or tearing. It is particularly important that the curvature of the front end surface 309a of the upper clamping member 309 has a sufficiently large radius of curvature at the point r in Figure 10a to prevent undue tension on the webbing which can lead to wear. In an example, the minimum radius of curvature r is five eighths of an inch (approx 15.9mm) for the dimensions of the assembly. The minimum radius of curvature at point r is 6.35mm as illustrated in Figure 10a. However, it is also advantageous if the upper surface of the upper clamping member extends below the level of the inner plates 305, so that the inner plates act to guide the webbing 315 therebetween as it passes over the upper clamping member 309, without the risk of the webbing "riding up" and catching on one of the inner plates.

Webbing 315 is passed through the assembly as shown in Figure 10. In particular, the free end of the webbing 315a is inserted into the rear end of the assembly between the inner plates 305, passed beyond the front of the shaft 307 and then over upper clamping member 309 and rearwardly over the upper surface of the upper clamping member 309, then forwardly between the clamping surface 320 of the upper clamping member 309 and the roller shaft 307, around the front of the roller shaft 307 and then back out through the rear end of the assembly, as shown.

Figures 12a to 12c show the various positions of the third embodiment [of] <u>in accordance with</u> the present invention, in use, and will not be described since they correspond to the positions shown in Figures 6a to 6c of the first embodiment described above.

The [described embodiments] <u>preferred embodiment</u> of the present invention [are] <u>is</u> designed for use with relatively thick polyester webbing having a breaking force in excess of 15000lb. The thickness of the webbing is not however critical, and the webbing tie down assembly has been found to work effectively with a variety of webbing thicknesses.

It is anticipated that the webbing tie down assembly of the present invention can be

WEBBING TIE DOWN ASSEMBLY

The present invention relates to a webbing tie down assembly or lashing restraint, having a clamping mechanism for securely clamping a webbing tie or lashing.

A webbing tie down assembly is provided in circumstances where webbing is used, for example, to tie down an object to a base, whereby the webbing can withstand applied loads arising from relative movement between the object and the base.

For instance, a plurality of webbing ties are used to secure a helicopter to the deck of a ship. Each webbing tie (or lashing) is fitted at one end to a fitting on the deck of the ship and at the other end is clamped and tensioned within a tie down assembly which is hooked onto a fitting of a helicopter.

A known webbing tie down assembly is shown in Figures 1A and 1B. The device comprises a hook, for fastening over a helicopter fitting, and a clamping and tensioning mechanism for a webbing tie. One end of the webbing tie is secured to a deck fitting, and the other free end is received within the clamping mechanism of the assembly as shown in Figures 1A and 1B. When the clamping mechanism is closed, a portion of the webbing is clamped between a roller shaft on one side and a clamping surface on the other side having a notch therein for gripping the webbing. Tensioning of the webbing is achieved by pulling on the free end of the webbing, as described in more detail below.

Although the existing webbing tie down assembly provides a combined clamping and tensioning mechanism, which is compact, lightweight, easy and convenient to use on the deck of a ship, it cannot sustain loads exceeding 5000lbs. Thus, even the use of about 20 webbing ties for an individual helicopter is insufficient to permanently secure it to the deck of a ship. Instead, heavy chains are used, to replace the temporary webbing ties, to ensure that a helicopter is safely secured to the deck of a ship.

The present invention aims to provide a webbing tie down assembly which achieves simple clamping and tensioning of the webbing, which can sustain increased loads compared with the prior art preferably enabling webbing ties to be used to permanently secure a helicopter to the deck of a ship, thereby obviating the need for securing chains.

The present invention is defined in accompanying claim 1.

The present invention thus provides a webbing assembly in which the webbing is clamped between a pair of substantially parallel clamping surfaces so that the clamping force on the webbing is distributed over a large surface area of the webbing. In a preferred embodiment the clamping surfaces are mutually opposed complementary curved surfaces.

In a preferred arrangement, the webbing assembly comprises a webbing clamping mechanism in which the webbing is wrapped around a plurality of pulley-like shafts which are arranged to uniformly distribute a load applied to the webbing when under tension.

Moreover, in the preferred embodiment the webbing assembly comprises a webbing clamping mechanism, in which guide surfaces for the webbing are provided which are arranged to prevent the webbing from coming into contact with itself when the mechanism is in use.

The present invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1A is a schematic side view of a prior art webbing tie down assembly;

Figure 1B is a schematic plan view of the prior art webbing tie down assembly of Figure 1A;

Figure 2 is a schematic view showing the use a webbing tie down assembly to secure a helicopter to the deck of a ship;

Figure 3 is a side view of a webbing tie down assembly forming a first embodiment;

Figure 3a is a schematic side view of a latching mechanism used with the webbing tie down assembly of Figure 3;

Figure 4 is a perspective view of the webbing tie down assembly of Figure 3;

Figure 5 is a perspective view of the inner parts of the webbing tie down assembly of Figure 3;

Figures 6a to c are schematic side views showing the embodiment of Figure 3 at various positions in use;

Figure 7 is a side view of a webbing tie down assembly forming a second embodiment;

Figure 8 is a perspective view of the webbing tie down assembly of Figure 7;

Figures 9a to c show the embodiment of Figure 7 in different positions in use;

Figure 10 is a side view of a webbing tie down assembly forming a third and preferred embodiment of the present invention;

Figure 10a is an enlarged side view of the clamping mechanism of the webbing tie down assembly of Figure 10;

Figure 11 is a perspective view of the webbing tie down assembly of Figure 10; and

Figures 12a to c show the embodiment of Figure 10 in different positions in use.

Figure 1 shows a known webbing tie down assembly comprising a pair of longitudinally extending parallel outer plates 3 enclosing a pair of parallel inner plates 5 which are linked together at a rear end of the assembly by a transversely extending handle 6. The thus linked inner plates 5 are together pivotally mounted on a roller shaft 7 extending transversely between, and secured to, the outer plates 3 such that the inner plates 5 lie parallel to the outer plates 3 and can pivot with respect thereto by movement of the handle 6. A hook 1, for attachment to the fitting of, for example, a helicopter, is formed integrally with the outer plates 3 at a front end of the assembly.

An upper clamping member 9 is secured between the inner plates 5 above the roller shaft 7 and has a notch 10 in a surface thereof opposing the surface of the roller shaft 7. The roller shaft 7 is mounted to the outer plates 3 through respective vertically extending slots 11 in the inner plates such that the roller shaft 7 can be displaced relative to the clamping member 9 by movement upwardly and downwardly within the slots 11.

Webbing 15 is passed into the assembly from the rear end, opposite to the front end which secures the hook 1, looped around the front of roller shaft 7, passed between the roller shaft 7 and clamping member 9, around the clamping member and returned out through the rear end of the assembly, as shown in Figure 1A.

In use, the hook 1 is secured to the fastening of the helicopter and the inner plates 5 are moved from the open position shown in solid outline in Figure 1A to the closed position shown in dashed outline in Figure 1A. A transversely extending latching bar 17, extending between the inner plates 5 and retained within respective longitudinally

extending slots 27 therein, is used to secure the inner plates 5 in the closed position with respect to the outer plates 3 by engagement with notches 29 in the outer plates 3.

In the closed position, the webbing 15 is clamped between the notch 10 in the clamping member 9 and the surface of the roller 7. From the clamped position, tension can be applied to the webbing 15 by pulling on the free end of the webbing. The pulling force is sufficient to displace the roller shaft 7 downwardly within the slots 11 in the inner plates 5, to remove the clamping force applied to the webbing and allow it to pass freely through the assembly between the clamping member 9 and the roller 7, without disengaging the latching bar 17 from the closed position.

Figure 2 illustrates one manner of use of the known webbing tie down assembly when securing a helicopter to the deck of a ship. This and other manners of use are possible with the webbing tie down assembly of the present invention.

Figures 3 to 5 show a webbing tie down assembly according to a first unclaimed embodiment. The assembly is generally similar in construction to the prior art assembly shown in Figures 1A and 1B.

The assembly thus comprises a pair of parallel inner plates 105 which are linked together by a handle 106 and are together pivotally mounted on a shaft 107 secured between a pair of parallel outer plates 103. The shaft 107 extends through a slot 111 in each of the inner plates 105 and is rigidly mounted to the outer plates 103.

A pair of securing points 123 are provided on the outer plates at a front end of the assembly for mounting a hook (not shown). The use of a pair of securing points prevents rotation of the hook relative to the outer plates 103.

A latching mechanism, shown in detail in Figure 3a, is provided to lock the inner

plates 105 in the closed position (as shown in Figure 3) relative to the outer plates 103. The latching mechanism comprises a latching bar 117 extending transversely between the inner plates 105 through longitudinally extending slots 127 in the inner plates 105 which cooperate with notches 129 in the outer plates 103 in the closed position. The latching bar 117 is biased by means of a leaf spring towards the front end of the slots 127 for engagement with the notches 129 in the outer plates 103 but can be released from engagement by sliding the latching bar 117 rearwardly along the slots 127 against the biasing force.

The clamping mechanism comprises an upper clamping member 119a mounted between the inner plates 105, and a lower clamping member 119b mounted between the outer walls 103. The clamping members 119a, 119b are mounted on the rear side of the assembly relative to the roller shaft 107.

The clamping members 119a, 119b provide respective mutually opposing generally planar clamping surfaces 120a, 120b, for clamping a relatively large surface area of the webbing 115, which passes between the two clamping surfaces 120a, 120b. It should be noted that the clamping members 119a, 119b have smooth surfaces and rounded edges to allow the webbing 115 to slide around the surfaces of the clamping members easily, without catching or tearing, as described below.

A pair of transversely extending pulley shafts 121a, 121b are mounted between the inner plates 105 in vertical alignment. It should be noted that the pulley shafts 121a, 121b are provided on the front side of the assembly relative to the roller shaft 107, and are spaced equidistantly therefrom.

The pulley shafts 121a, 121b and roller shaft 107 are preferably made from hard drawn stainless steel, as is a load bearing shaft 124 mounting the upper clamping member 119a to the inner plates 105. The shaft 124 bears a large proportion of the load, as

described below.

Webbing 115 is passed through the assembly as shown in Figure 3. In particular, the free end of the webbing 115a is inserted into the rear end of the assembly between the inner plates 105, wrapped around the front sides of the pulley shafts 121a, 121b, over the upper surface of the upper clamping member, around the curved rear of the upper clamping member where the load bearing shaft 124 is positioned, between the clamping surfaces of the first and second clamping members 119a, 119b, around the roller shaft 107 and then back out through the rear end of the assembly. It should be noted that the pulley shafts 121a, 121b and clamping members 119a, 119b are arranged to uniformly distribute any load applied to the webbing 115 whilst keeping the surfaces of the webbing apart.

Figures 6a to c show the various positions of the first embodiment, in use.

Referring to Figure 6c, the latching bar 117 is disengaged from the notches 129 within the outer plates 103, so that the inner plates 105 can be pivoted about the roller shaft 107 by lifting of the handle 106 to the illustrated open position. In this position, the webbing 115 is neither clamped nor under tension, and is free to run around the pulley mechanism and between the clamping surfaces to enable the hook 101 to be released from, or secured to, for example, a helicopter fitting as shown in Figure 2.

Once the hook 101 has been secured to the helicopter fitting, the handle 106 is lowered to rotate the inner plates back around shaft 107 to the closed position as shown in Figure 3 and the latching bar 117 engages the notches in the outer plates to retain the inner plates in the closed position relative to the outer plates. It is then necessary to pull taut the webbing 115 which extends between the deck and the helicopter, and this is achieved by simply pulling on the free end 115a as shown by the arrows in Figure 6a to tension the webbing 115. The force applied to the free end 115a of the webbing exerts a

force on the roller shaft 107 which displaces the roller shaft 107 downwardly within the slots 111 in the inner plates 105. The ends of the roller shaft 107 are secured to the outer plates 103, which mount the lower clamping member 119b, so that the outer plates 103 and lower clamping member 119b are also displaced downwardly, thus disengaging the clamping surfaces of the upper and lower clamping members and permitting the webbing 115 to move therebetween. Thus, the webbing 115 can be pulled through the assembly to apply tension to the webbing 115 and thus remove any slack between deck and helicopter.

Figure 6b shows the forces applied to the webbing 115 when the assembly is in use. In particular, when the helicopter is secured to the deck of a ship, the movement of the deck will cause the helicopter to sway, and an increased load to be applied to the webbing 115. The load is particularly applied to the shaft 124 securing the upper clamping member 119a, but is also distributed over the pulley shafts 121a, 121b. In this position, the clamping surfaces 120a, 120b are brought together so that they lie essentially parallel and apply clamping pressure to the webbing 115 as shown. This clamping effect is achieved because roller shaft 107 moves upwardly within the slots 111 in the inner plates 105 to align the clamping surfaces 120a, 120b parallel with each other with the distance between them slightly less than the thickness of the webbing.

A second embodiment, also unclaimed, is shown in Figures 7 to 9. The structural features of this embodiment are generally the same as the first embodiment and the following description relates mainly to the different features of the second embodiment.

In this second embodiment, the roller shaft 207 is located in slots 211 in the outer plates 203, which slots 211 extend in an arc generally centred about the axis of the latching bar 217. The slots 211 thus permit displacement of the inner plates 205 within the outer plates 203 whereas in the first embodiment the outer plates are displaced relative to the inner plates.

The arcuate curvature of slots 211, being generally centred about the axis of the latching bar 217, prevents the latching bar 217 from movement, arising during clamping and unclamping of the webbing, which can lead to wear in the region surrounding the notches which engage the bar 217. Instead, the roller shaft 207 can take up this movement, within the arcuate slots, so that the axis of the latching bar 217 remains stationary during tensioning of the webbing, thus preventing wear. The arcuate shape of slots 211 thus provides advantages over the vertically extending slots 111 of the first embodiment, and it will be appreciated that this feature can be incorporated within the design of the first embodiment, if desired.

In the second embodiment, the clamping members 219a, 219b are arranged in a similar manner to the first embodiment, whereby the generally planar clamping surfaces 220a, 220b are aligned parallel, and clamp a large surface area of the webbing 215 when under tension. The pulley shafts 221a, 221b, however, are arranged on the same side of the roller shaft 207 as the latching bar 217. The pulley shafts 221a, 221b, together with the clamping surfaces, are positioned to guide the webbing 215 and distribute the load between them, whilst ensuring that the surfaces of different parts of the webbing 215 are kept out of contact with each other.

The positions of the assembly, in use, are shown in Figure 9a to c and correspond with the positions shown in Figures 6a to c as described above in respect to the first embodiment. As can be seen from Figure 9a, when the webbing 215 is being tightened by pulling on the free end 215a, the clamping surfaces are released from contact with the webbing 215 as the roller shaft 207 moves upward to the upper end of the arcuate slots 211 and tilts the inner plates 205 relative to the outer plates 203, as shown. When the webbing 215 is under tension, as shown in Figure 6b, the roller shaft 207 moves downwardly within the arcuate slots 211 to align the inner plates 205 with respect to the outer plates 203, and thus to position the clamping surfaces 220a, 220b parallel to each other, as shown.

In the second embodiment, the upper clamping member 219a has a larger surface area than in the first embodiment to provide a larger contact surface and distribute the clamping force across a larger surface area of the webbing 215.

The materials and gauge of the components of the assembly are chosen to be lighter in weight than the first embodiment, that is, components are formed from aluminium alloys wherever possible and narrower gauge components are employed. It will be appreciated that the assembly should be as light as possible for an individual to carry several at a time, whilst meeting the functional load-bearing requirements. Thus, the described assemblies need to balance the features of heavy and relatively thick hard drawn stainless steel shafts necessary to perform load bearing functions, and more lighter weight material.

Figures 10 to 12 show a webbing tie down assembly according to a third and preferred embodiment in accordance with the present invention. Like the first embodiment, the assembly of the third embodiment is similar in construction to the prior art assembly shown in Figures 1A and 1B, but dimensioned on a larger scale and with higher grade materials to achieve the increased load bearing requirements.

In particular, the assembly comprises a pair of parallel inner plates 305 which are linked together by a handle 306 and are together pivotally mounted on a roller shaft 307 secured between a pair of parallel outer plates 303. The shaft 307 extends through a slot 311 in each of the inner plates 305 and is rigidly mounted to the outer plates 303.

A pair of securing points 323 are provided on the outer plates at a front end of the assembly which mount a hook 301. The use of a pair of securing points prevents rotation of the hook relative to the outer plates 303.

As in the first and second embodiments, a latching mechanism is provided to lock

the inner plates 305 in the closed position relative to the outer plates 303. The latching mechanism comprises a latching bar 317 extending transversely between the inner plates 305 through longitudinally extending slots 327 in the inner plates 305 which cooperate with notches 329 in the outer plates 303 in the closed position. The latching bar 317 is biased by means of a leaf spring towards the front end of the slots 327 for engagement with the notches 329 in the outer plates 303 but can be released from engagement by sliding the latching bar 317 rearwardly along the slots 327 against the biasing force.

The clamping mechanism of the third embodiment differs from the clamping mechanism of the first and second embodiments. In particular, instead of providing planar surfaces for clamping the webbing over a relatively large surface area, the third embodiment incorporates complementary curved clamping surfaces for clamping the webbing.

Referring to Figure 10, the clamping mechanism comprises an upper clamping member 309 mounted between the inner plates 305, and the roller shaft 307 forms the lower clamping member. The shape of the upper clamping member 309 is particularly important for the clamping function and will be described in detail hereinafter, with reference to Figure 10a.

In accordance with the present invention, the clamping surface 320 of the upper clamping member 309, which opposes the surface of roller shaft 307, is formed with a curvature complementary to the curvature of the shaft such that when webbing 315 is clamped between the clamping members 307, 309 the clamping surfaces lie substantially parallel, separated by a distance slightly less than the normal thickness of the webbing, thus applying a generally uniform clamping force over a large surface area of the webbing.

The remainder of the surface of the upper clamping member 309 is smoothly curved to allow the webbing 315 to slide around the clamping member without catching

or tearing. It is particularly important that the curvature of the front end surface 309a of the upper clamping member 309 has a sufficiently large radius of curvature at the point r in Figure 10a to prevent undue tension on the webbing which can lead to wear. In an example, the minimum radius of curvature r is five eighths of an inch (approx 15.9mm) for the dimensions of the assembly. The minimum radius of curvature at point r is 6.35mm as illustrated in Figure 10a. However, it is also advantageous if the upper surface of the upper clamping member extends below the level of the inner plates 305, so that the inner plates act to guide the webbing 315 therebetween as it passes over the upper clamping member 309, without the risk of the webbing "riding up" and catching on one of the inner plates.

Webbing 315 is passed through the assembly as shown in Figure 10. In particular, the free end of the webbing 315a is inserted into the rear end of the assembly between the inner plates 305, passed beyond the front of the shaft 307 and then over upper clamping member 309 and rearwardly over the upper surface of the upper clamping member 309, then forwardly between the clamping surface 320 of the upper clamping member 309 and the roller shaft 307, around the front of the roller shaft 307 and then back out through the rear end of the assembly, as shown.

Figures 12a to 12c show the various positions of the third embodiment in accordance with the present invention, in use, and will not be described since they correspond to the positions shown in Figures 6a to 6c of the first embodiment described above.

The preferred embodiment of the present invention is designed for use with relatively thick polyester webbing having a breaking force in excess of 15000lb. The thickness of the webbing is not however critical, and the webbing tie down assembly has been found to work effectively with a variety of webbing thicknesses.

It is anticipated that the webbing tie down assembly of the present invention can be

used, in conjunction with webbing having the abovementioned breaking force, to permanently secure a helicopter to the deck of a ship, without the need for chains.

It will be appreciated that various modifications may be made to the described embodiments, to meet the working requirements including the thickness and material of the webbing, and the load which the assembly is designed to withstand. For instance, the skilled person will appreciate that the curvature of the upper clamping member of the third embodiment could be achieved using a pair of bolts, mounted parallel to each other, with the required radius of curvature.

CLAIMS:

1. A webbing tie down assembly, comprising:

an inner frame (305) and an outer frame (303), the inner frame and the outer frame being arranged to support webbing (315) therein and including a clamping mechanism comprising: a first clamping member (309) supported by the inner frame (305) and having a first clamping surface (320), and a second clamping member (307) supported by the outer frame (303) and having a second clamping surface, the inner frame (305) being mounted with respect to the outer frame (303) for movement between a first position in which the first and second clamping surfaces are substantially together for clamping webbing (315) therebetween, and a second position in which the clamping surfaces are apart for allowing webbing (315) to slide therethrough; and further including a tensioning mechanism (311), for disengaging the first and second clamping surfaces when the inner frame and outer frame are in the first position to permit the webbing (315) to slide therebetween to enable tensioning of the webbing (315),

characterized in that one (307) of the first and second clamping members comprises a shaft, and the clamping surface (320) of the other (309) clamping member has a complementary curvature, so that the clamping surfaces of the first (309) and second (307) clamping members lie substantially parallel in the first position so that a clamping force on the webbing (315) is distributed over a relatively large surface area of the webbing.

2. A webbing tie down assembly as claimed in claim 1, in which at least one (309) of the first and second clamping members has a supporting surface (309a), substantially opposite the clamping surface (320), the supporting surface (309a) being arranged to support the webbing (315).

3. A webbing tie down assembly as claimed in claim 2, in which the or each supporting surface (309a) is smoothly curved to allow the webbing (315) to slide thereon.

4. A webbing tie down assembly as claimed in claim 1, 2 or 3, wherein the shaft (307) is cylindrical.

5. A webbing tie down assembly as claimed in claim 2 or claim 3, wherein the supporting surface (309a) is provided on the other (309) clamping member for supporting webbing (315) wrapped therearound, the supporting surface (309a) being configured to prevent undue tension on webbing (315) supported thereby.

6. A webbing tie down assembly as claimed in claim 5, wherein the inner frame comprises a first pair of substantially parallel inner plates (305), and the other frame comprises a second pair of substantially parallel outer plates (303), the assembly further comprising a roller shaft (307), wherein the first pair of substantially parallel inner plates (305) is mounted on the roller shaft (307) to pivot between the first and second positions, and wherein in the first position, the inner plates (305) of the first frame lie between the outer plates (303) of the second frame, and wherein the supporting surface (309a) extends within the boundary of the inner plates (305) in the first position.

7. A webbing tie down assembly as claimed in claim 6, further comprising a latching mechanism (317, 327), for securing the inner plates (305) with respect to the outer plates (303) in the first position.

8. A webbing tie down assembly as claimed in claim 7, wherein the first pair of substantially parallel inner plates (305) are linked together by a handle (306) for movement between the first and second positions.

9. A webbing tie down assembly as claimed in claim 7 or claim 8, in which the tensioning mechanism includes a pair of slots (311) in respective ones of either the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, the roller shaft (307) extending through the pair of slots and being rigidly mounted

to the other of the first pair of substantially parallel inner plates or the second pair of substantially parallel outer plates, so that the first frame can be displaced relative to the second frame along the length of the slots (311).

10. A webbing tie down assembly as claimed in claim 9, in which the slots (311) are curved.

11. A webbing tie down assembly as claimed in claim 9 or claim 10, in which the roller shaft (307) forms one of the first and second clamping members and the other of the first and second clamping members is rigidly secured between the parallel plates of the frame carrying the slots (311).

12. A webbing tie down assembly as claimed in any preceding claim, in which the assembly has a first end and a second end, the first end carrying a hook (301) mounted to the first or second frame for attachment to an object to be tied down, the hook (301) secured to the first or second frame at a pair of securing points.

13. A webbing tie down assembly as claimed in claim 12, in which webbing (315) enters and exits the assembly at the second end thereof, the webbing (315) being wrapped around at least one supporting surface and between the clamping surfaces of the first and second clamping members.

14. A webbing tie down assembly as claimed in claim 13, in which the at least one supporting surface includes one or more pulley shafts arranged within the assembly to distribute the load of the webbing (315) whilst spacing apart the surfaces thereof.

15. A webbing tie down assembly as claimed in claim 13 or claim 14, in which the supporting surface (309a) adjacent the second end of the assembly has a minimum radius of curvature of 6.35mm.

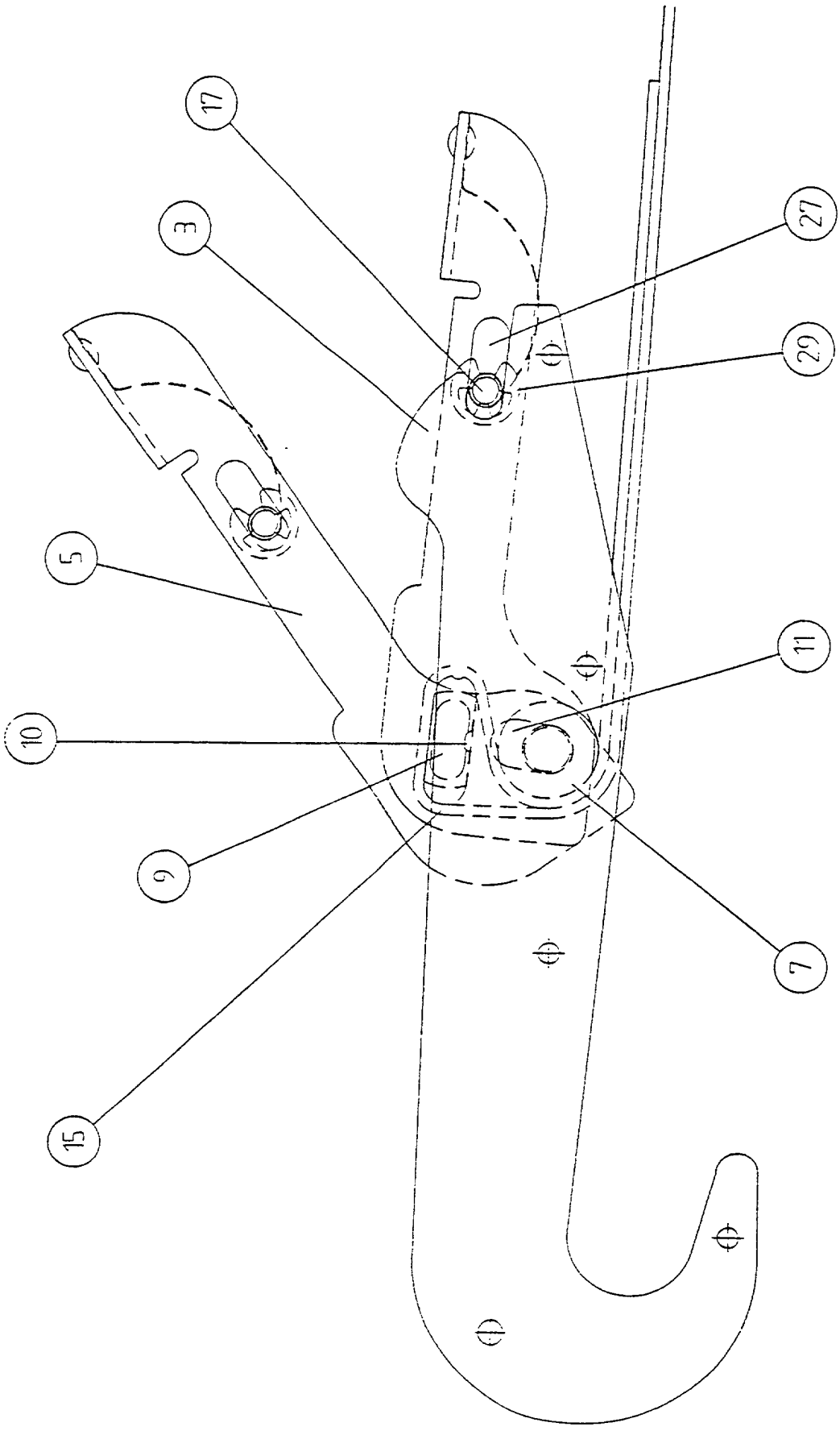


FIGURE 1A

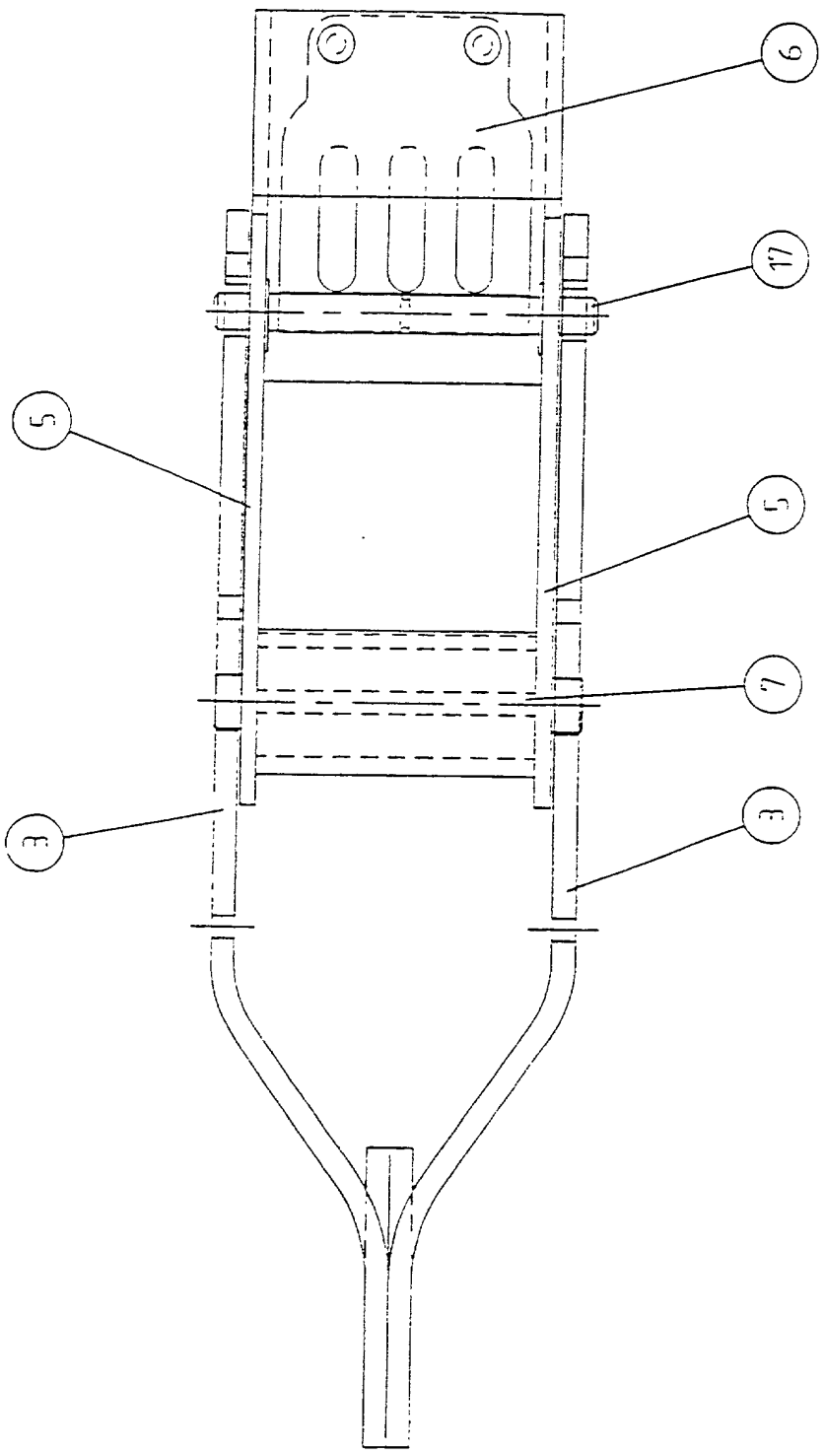
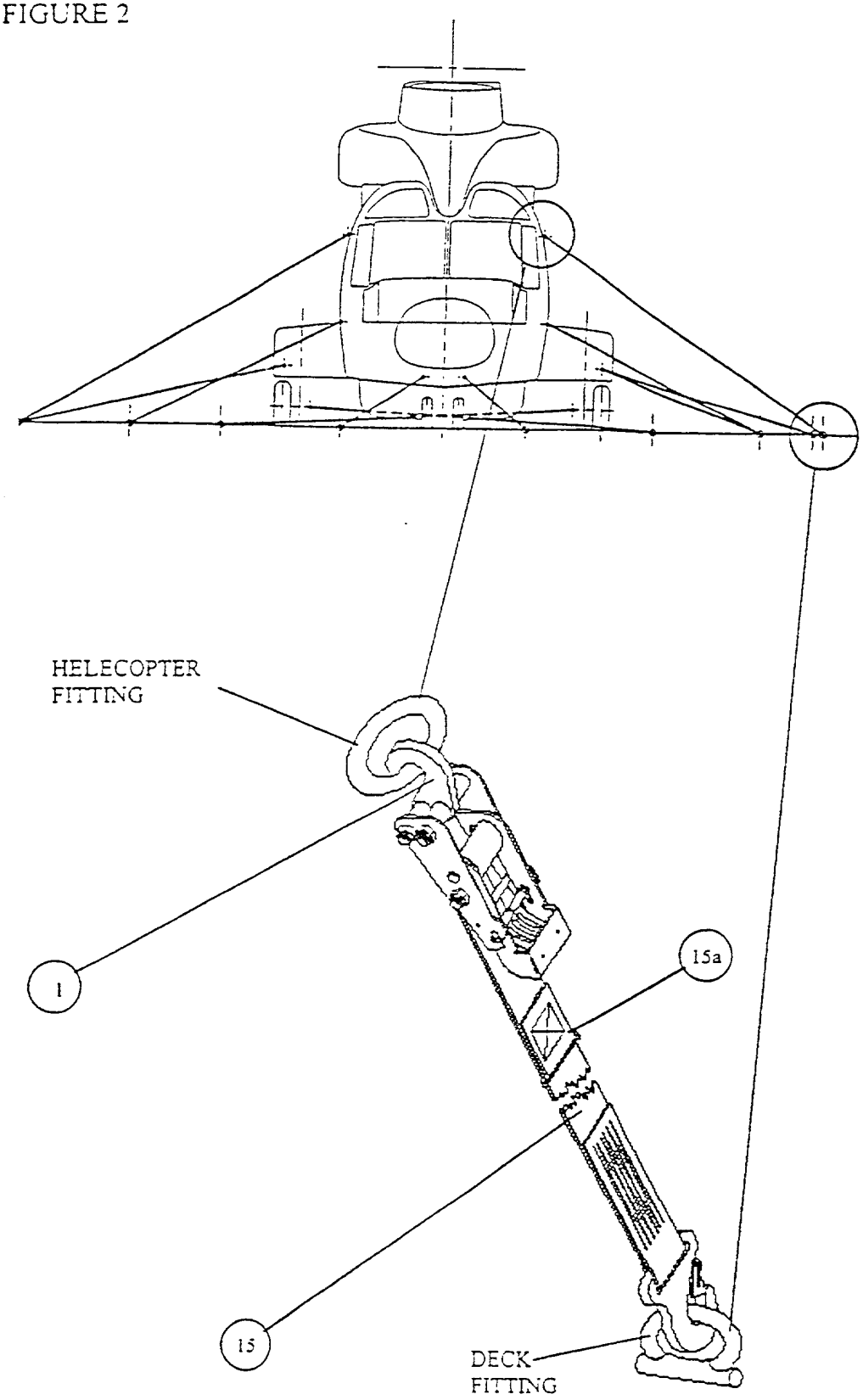
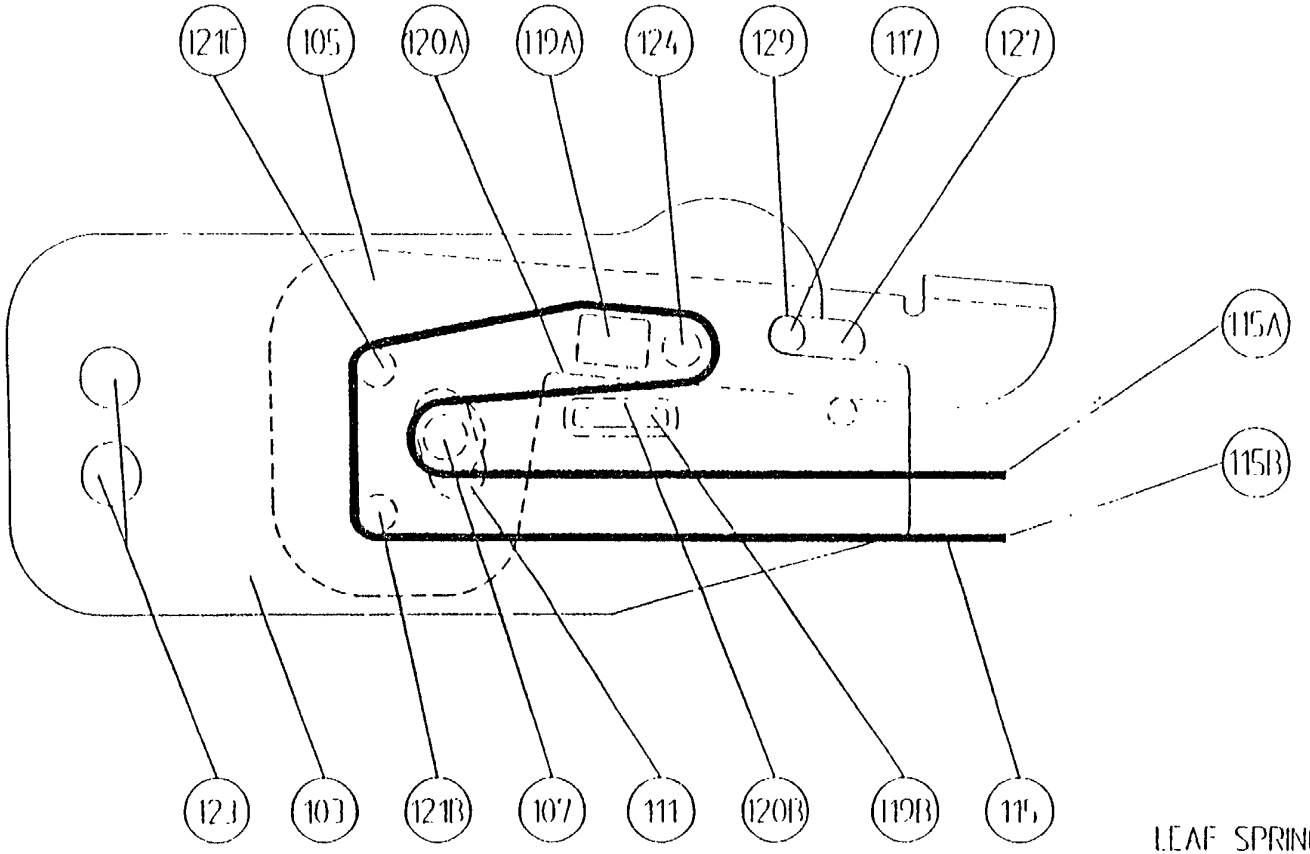


FIGURE 1B

FIGURE 2



IGURE 3



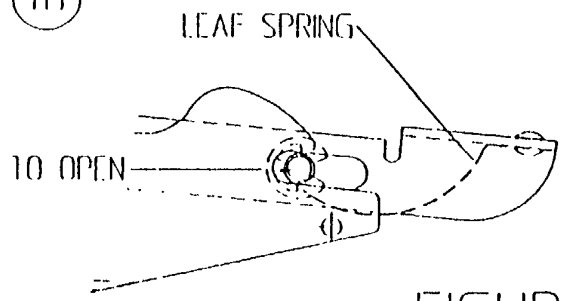


FIGURE 3A

FIGURE 4

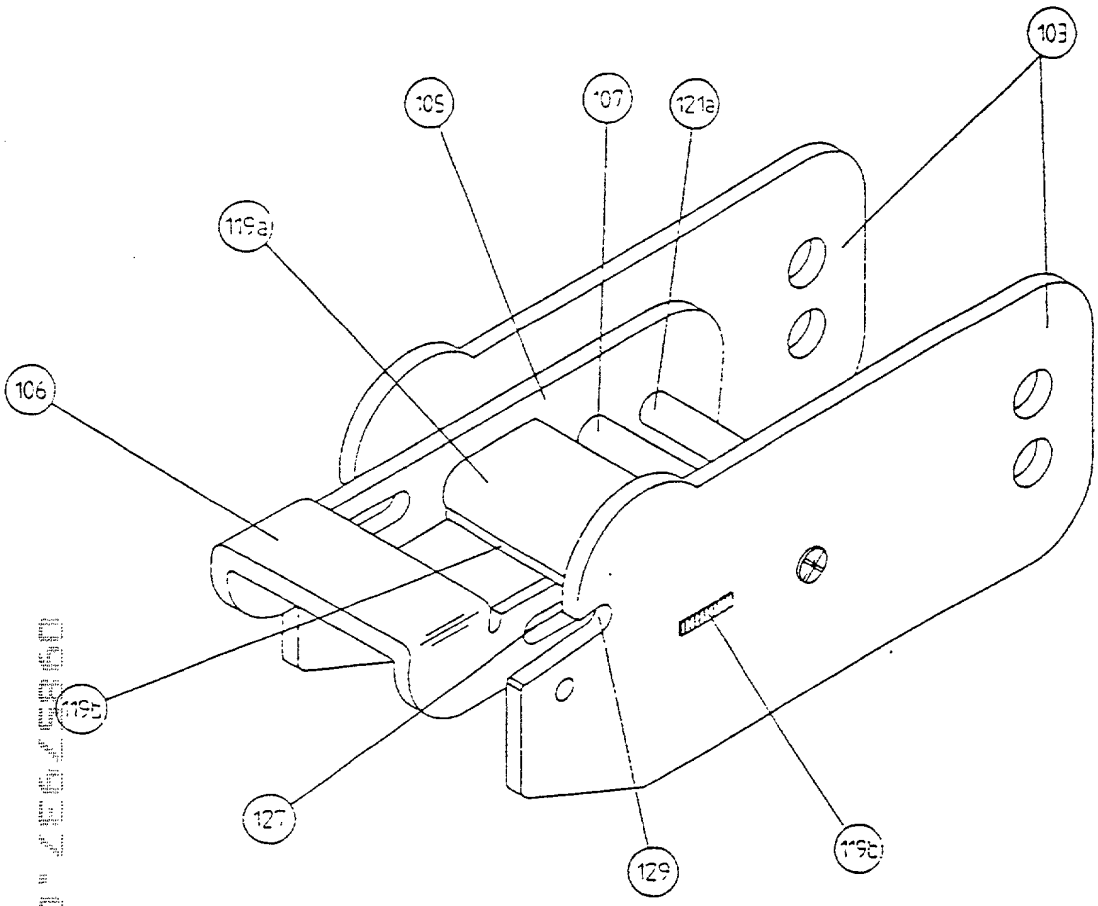


FIGURE 5

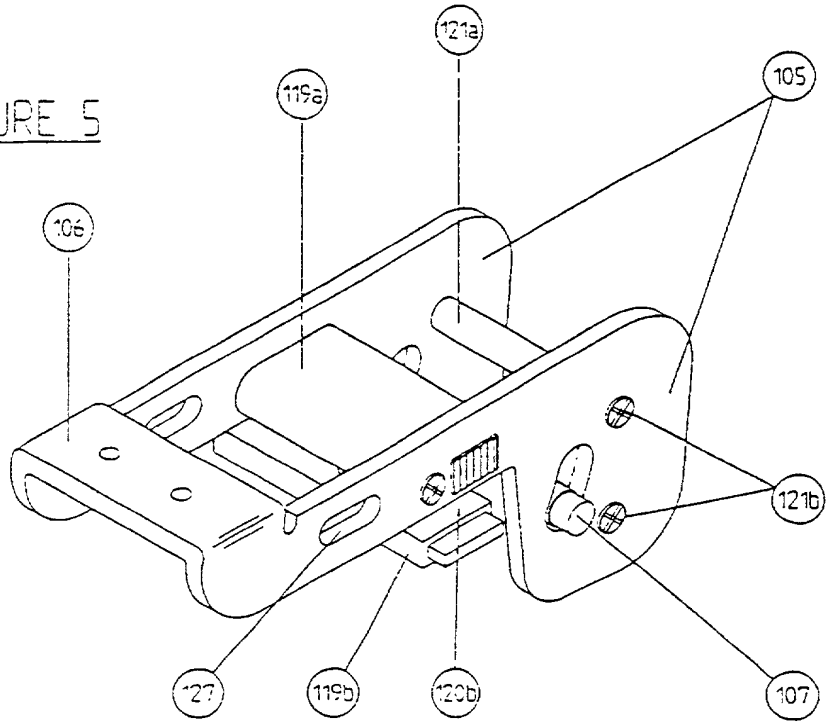
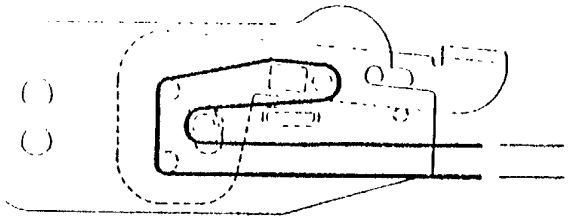
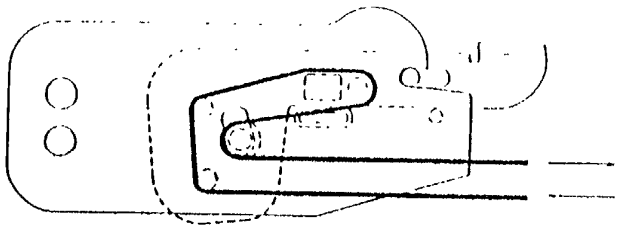


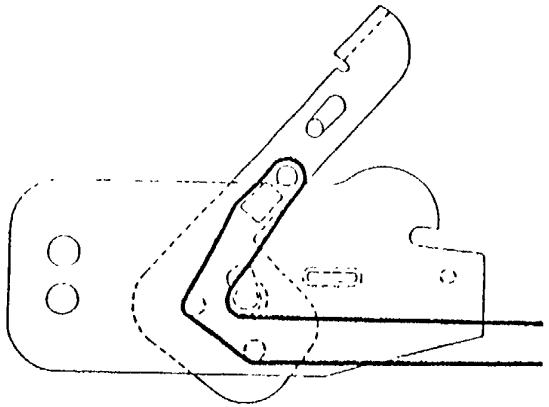
FIGURE 6



POSITION WHEN LASHING BEING TIGHTENED BY DECK CREW.



POSITION WHEN LASHING UNDER TENSION FROM SWAYING OF HELICOPTER.



OPEN POSITION TO RELEASE LASHING FROM HELICOPTER AND DECK.

09/857937

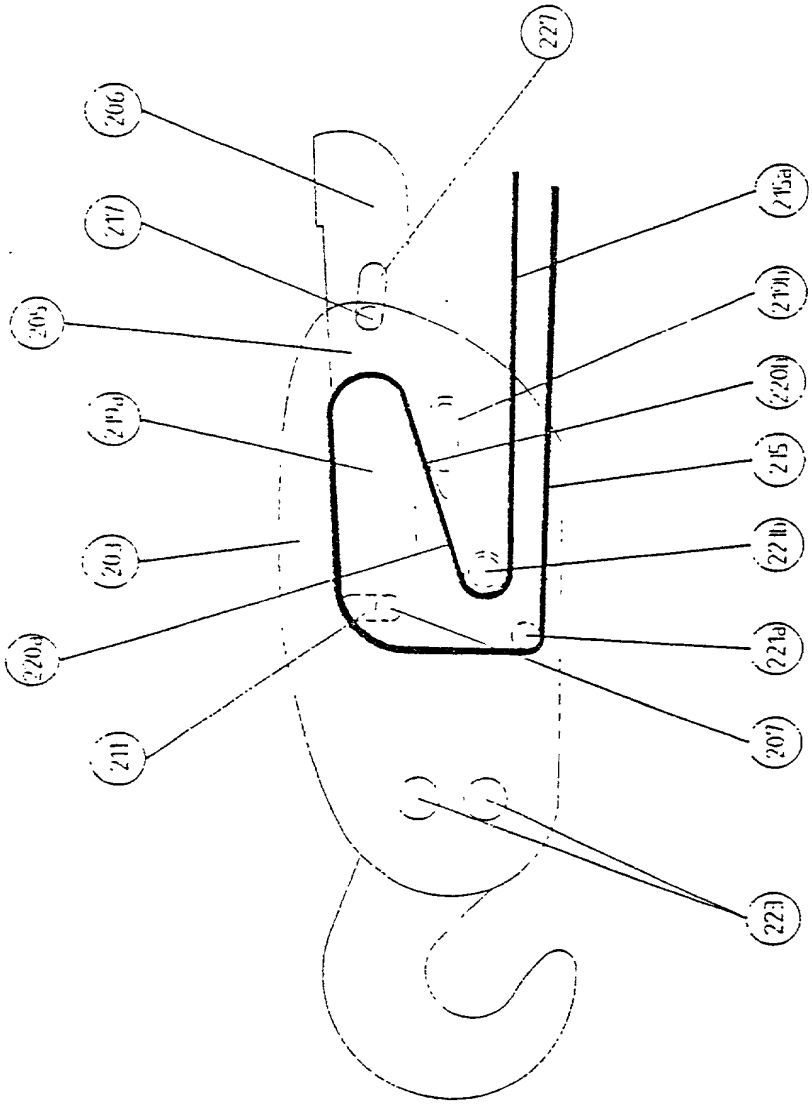


FIGURE 7

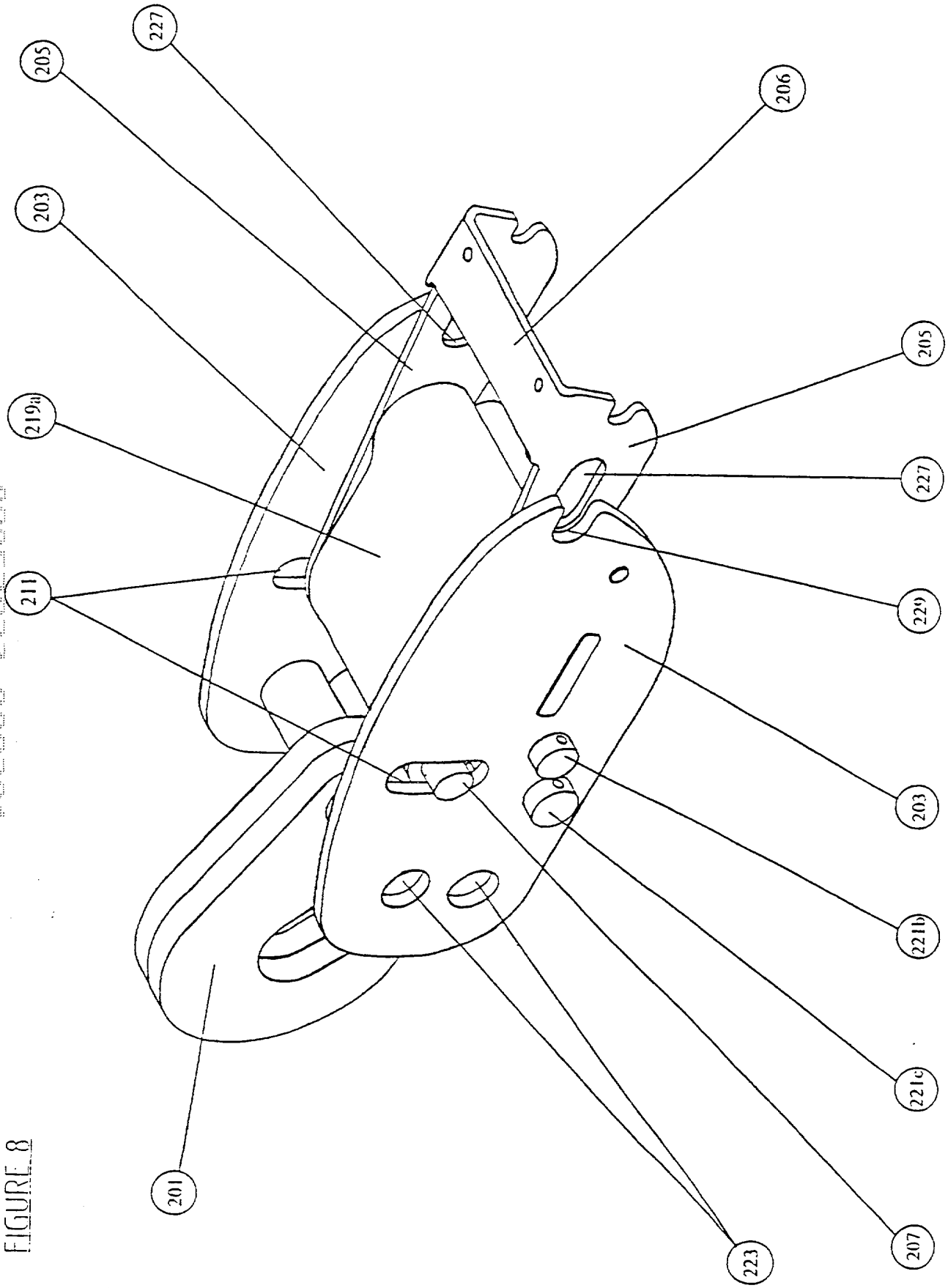
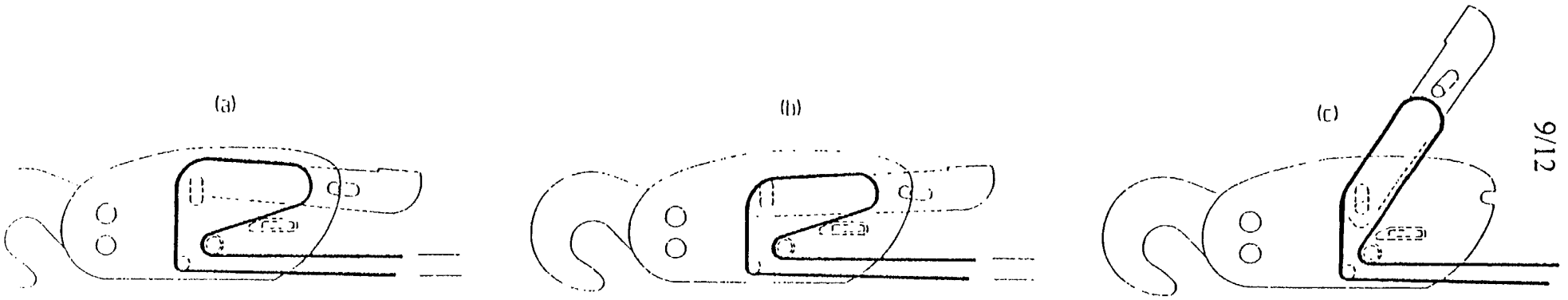


FIGURE 8

FIGURE 9



POSITION WHEN LASHING BEING TIGHTENED BY DECK CREW

POSITION WHEN LASHING UNDER TENSION FROM SWAYING OF HELICOPTER.

OPEN POSITION TO RELEASE LASHING FROM HELICOPTER AND DECK.

09/857937

09/857937

FIGURE 10a

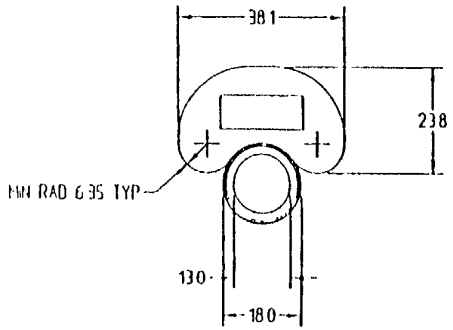
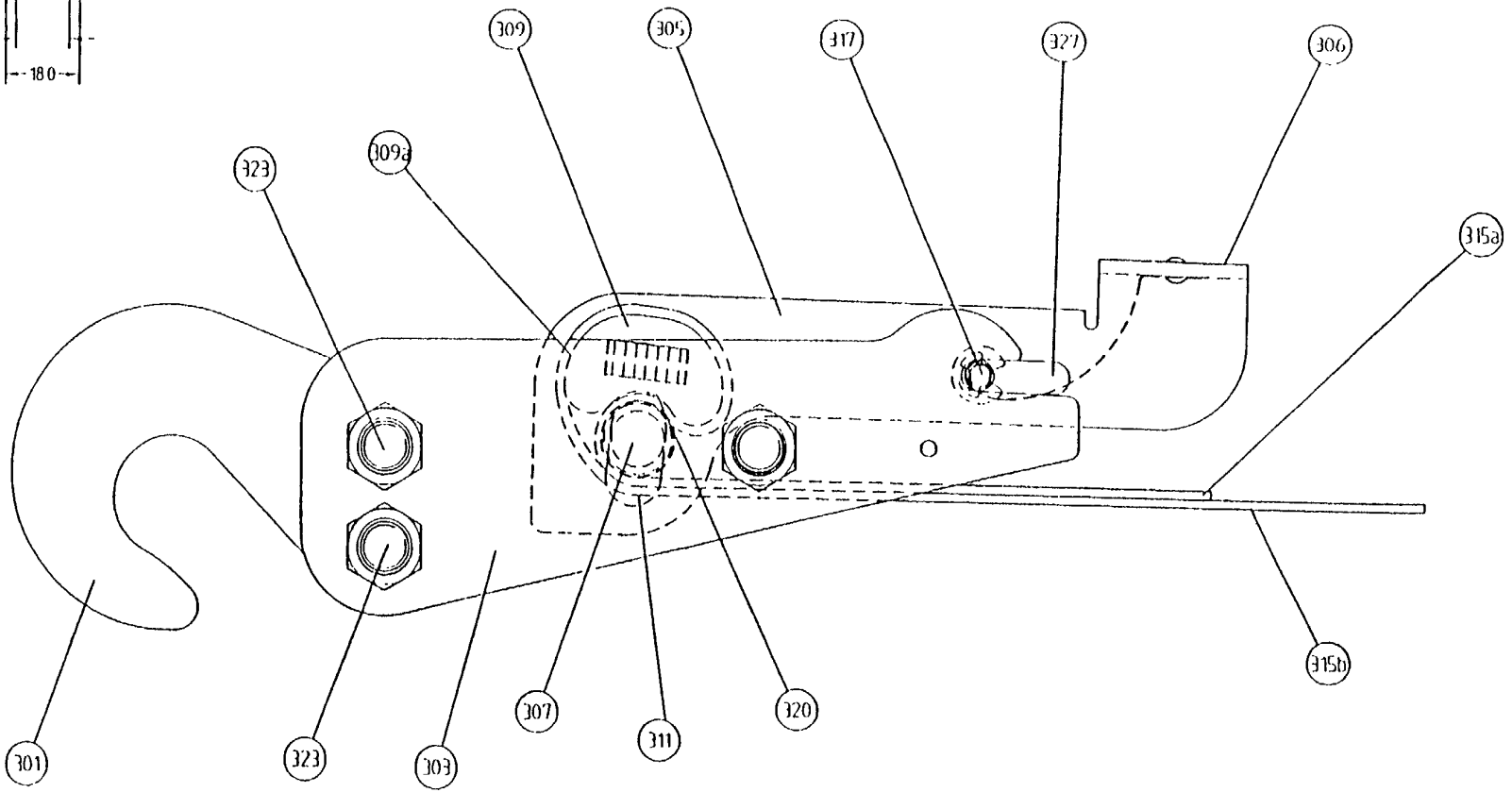


FIGURE 10



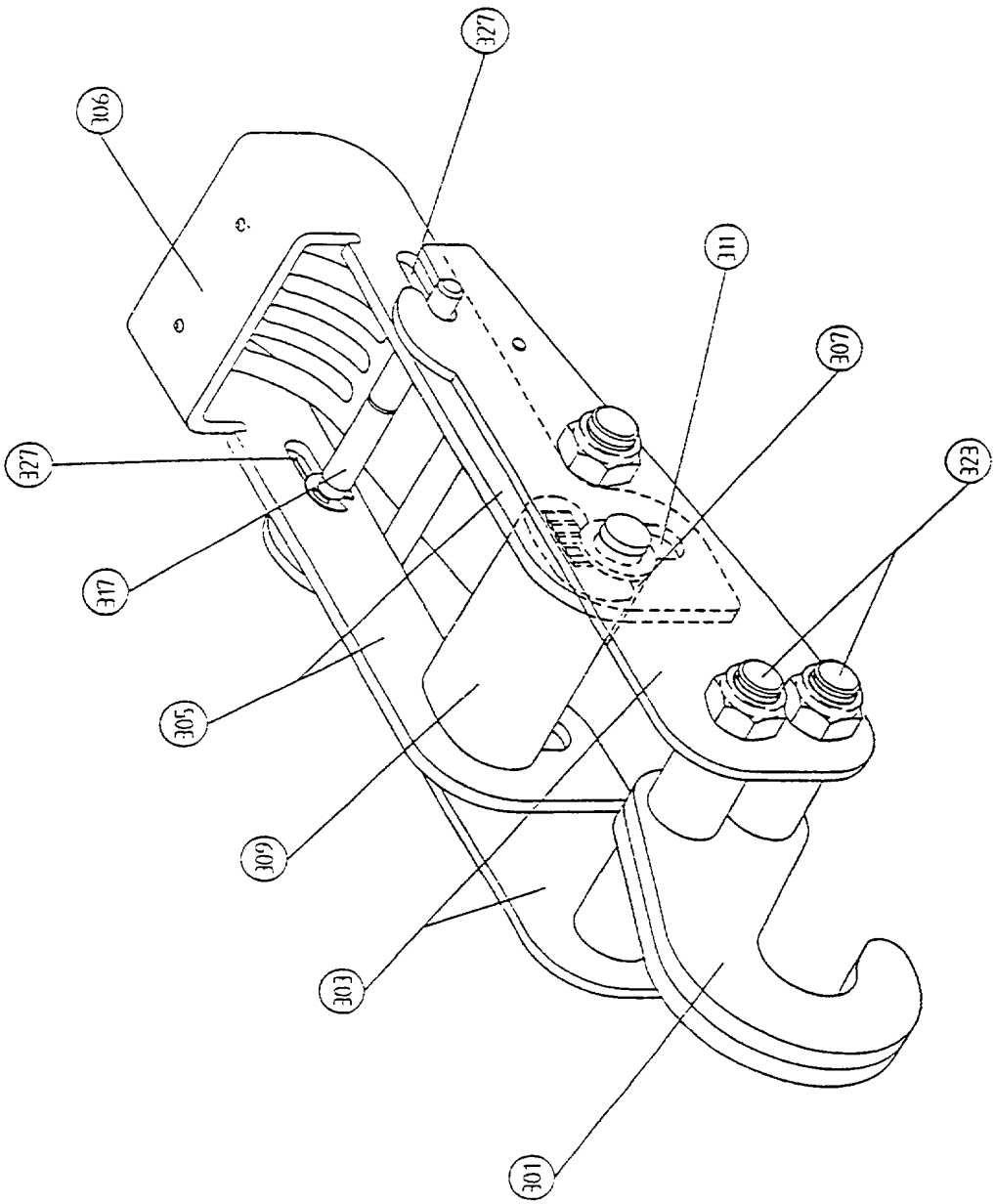
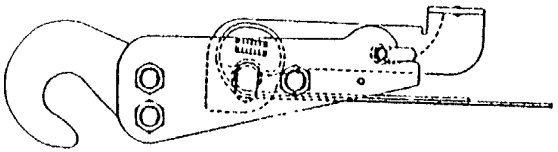


FIGURE 11

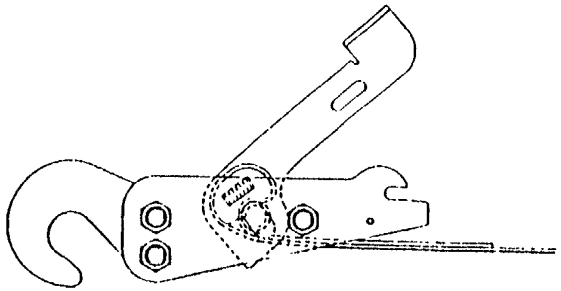
IGURE 12

(A)



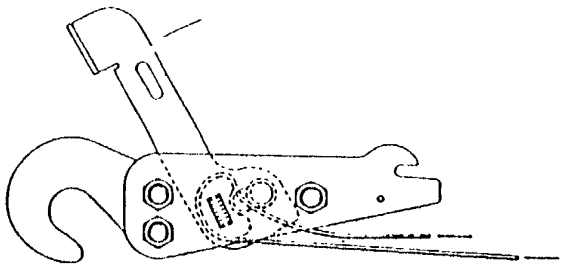
POSITION WHEN LASHING
IS BEING TIGHTENED BY
DECK CREW.

(B)



POSITION WHEN LASHING
IS UNDWER TENSION FROM
SWAYING HELICOPTER

(C)



OPEN POSITION TO
RLLEASE LASHING FROM
HLLICOPTER AND DECK.

09/857937

#3

6277

DECLARATION AND POWER OF ATTORNEY

We, the below named inventors, hereby declare that:

Our residences, post office addresses, and citizenships are as stated below next to our respective names.

We believe we are the original, first, and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **WEBBING TIE DOWN ASSEMBLY,** the specification of which is attached hereto and which claims priority from PCT Application No. PCT/GB99/04213 filed on December 13, 1999 which claims priority from GB Pat. Appln. No. 9827306.3 filed December 11, 1998 and GB Pat. Appln. No. 9904250.9 filed February 24, 1999.

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

We acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

We hereby declare that all statements are made hereby of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And we hereby appoint:

Maurice E. Gauthier	-	Reg. No. 20,798
Richard L. Stevens	-	Reg. No. 24,445
Matthew E. Connors	-	Reg. No. 33,298
William E. Hilton	-	Reg. No. 35,192
Patrick J. O'Shea	-	Reg. No. 35,305
Arlene J. Powers	-	Reg. No. 35,985
Richard L. Stevens, Jr.	-	Reg. No. 44,357

all of the firm of Samuels, Gauthier & Stevens, our attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

We request that all correspondence be directed to:

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Attn: Maurice E. Gauthier

1-00

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(Residence)

(Date)

Great Britain
(Citizenship)

Same as above
(Post Office Address)

DECLARATION AND POWER OF ATTORNEY

We, the below named inventors, hereby declare that:

Our residences, post office addresses, and citizenships are as stated below next to our respective names.

We believe we are the original, first, and joint inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled **WEBBING TIE DOWN ASSEMBLY,** the specification of which is attached hereto and which claims priority from PCT Application No. PCT/GB99/04213 filed on December 13, 1999 which claims priority from GB Pat. Appln. No. 9827306.3 filed December 11, 1998 and GB Pat. Appln. No. 9904250.9 filed February 24, 1999.

We hereby state that we have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

We acknowledge the duty to disclose information which is material to patentability in accordance with Title 37, Code of Federal Regulations, Section 1.56.

We hereby declare that all statements are made hereby of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And we hereby appoint:

Maurice E. Gauthier	-	Reg. No. 20,798
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William E. Hilton	-	Reg. No. 35,192
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Richard L. Stevens, Jr.	-	Reg. No. 44,357

all of the firm of Samuels, Gauthier & Stevens, our attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

We request that all correspondence be directed to:

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